



UNIVERSITY OF GOTHENBURG
SCHOOL OF BUSINESS, ECONOMICS AND LAW

Master Degree Project in International Business and Trade

Managing Supplier Innovation

A case study of the Wind-Turbine Industry

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Master Degree Project No. 2014:11
Graduate School

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ABSTRACT

Having reliable supplier relationship is one of the main sources for companies' open innovation strategy, exploring and raising the level of innovativeness. Consequently, managing open innovation is a crucial challenge for managers, particularly in many high tech industries, where the interests of buyer and supplier change constantly. Moreover, in line with modularization process of components in an almost matured wind turbine industry, it is essential to understand that configuring the supplier network is a dynamic process where suppliers always strive for climbing up the value chain for gaining larger volume of business. Hence, managers must govern buyer-supplier relationship by utilizing various tools such as appropriate safeguards as well as well-defined management structure in order to minimize the risks, reach outside the firm's internal boundaries, create initiatives for innovation generation, have the right posture to each supplier relationship and finally absorb innovation opportunities in each sourcing activity by solving problems with various degrees of complexities through interaction across distinct relationships with various degrees of innovation potential.

Additionally, a suitable sourcing strategy is a pre-condition mechanism to efficiently absorb all sources of innovation, devote the limited resources in most efficient way, become a pioneer in term of innovation generation in the entire value chain and finally achieve sustainable competitive advantage. Hence, in the buyer's dominated wind turbine industry, managers shall take the opportunity within their outsourcing strategy framework to identify new potential suppliers for involvement in an early stage of innovation generation process and thus absorbing new ideas for innovation generation in the entire value chain.

Key words: buyer-supplier relationship, open innovation, supplier innovation, supplier segmentation, supplier interface, hidden knowledge, simple versus complex innovation problem, radical versus incremental innovation, exploration versus exploitation, supplier involvement, global sourcing, risk-return/trade-off, ambidexterity

ACKNOWLEDGMENTS

We owe our gratitude to several people that have contributed with their help, inspiration, and inputs and made our initial thesis idea into reality.

First and foremost, we would like to express our deepest appreciation and gratitude to our supervisor Professor Bent Petersen at Copenhagen Business School. Thank you for all the useful comments, remarks and engagement throughout the process of this master thesis.

Moreover, we are very thankful to all the professional people at the companies that we had the privilege to interview. Thank you for your valuable time, effort, and answers that brought value to this thesis. It would not have been possible without you.

In addition, we would also like to thank our fellow students Lars Agebro and Henrik Chan who act as our opponents during the final master thesis seminar and contributed to an interesting and valuable discussion.

Finally, we want to dedicate a special thanks to our loved ones - family and friends for all the sacrifices that you have made on our behalf and all the support you have given throughout the entire process of this thesis.

Thank You!

Gothenburg August 2014

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TABLE OF CONTENT

1. Introduction	1
1.1 Background.....	1
1.2 Problem Discussion.....	4
1.4 Delimitations.....	7
1.5 Research Purpose.....	8
1.6 Research Outline.....	11
2. Literature Review	12
2.1 The concept of Innovation.....	12
2.2 The concept of Open Innovation.....	14
2.3 Inter-organizational relationship and innovation generation.....	14
2.4 The Importance of Supplier Innovation.....	16
2.5 Managing supplier involvement and solving innovation problems.....	17
2.6 Managing contextual factors in open innovation.....	18
2.7 The Key dimensions in our study.....	19
2.7.1 The nature of the problem.....	19
2.7.2 The nature of the knowledge.....	20
2.7.3 Exploration and Exploitation.....	21
2.7.4 New vs. Well-established Supplier.....	22
2.8 Supplier Segmentation and Supplier Interface.....	26
2.8.1 Supplier Categories.....	26
2.9 The posture of supplier relationships.....	29
2.9.1 Involvement demands resources.....	30
2.10 Buyer-Supplier Relationship Models.....	31
2.10.1 Arms' Length Relationship.....	32
2.10.2 Strategic Partnership.....	33
2.10.3 Durable Arms' Length Relationship.....	34
2.10.4 Business Partnership.....	36
3. Conceptual Framework	37
THE TWO DIMENSIONAL MODEL	37
Y dimension (New vs. well-established supplier).....	37
X dimension (Simple vs. Complex Innovation).....	39
Complex innovation and new versus well-established suppliers.....	39
Simple innovation and new versus well-established suppliers.....	40
The main outcome of the conceptual framework.....	40
4. Methodology	41
4.1 Research approach.....	42
4.2 Research Design.....	42
4.3 Research Unit and Sample.....	43
4.4 Case Companies.....	43
4.5 Data collection method.....	45
4.6 Interview Process.....	45
4.7 Analytic Procedures.....	47
5. Empirical Background	47
5.1 The case study of the wind turbine industry.....	48
5.2 The main challenge.....	50

6. Empirical Findings.....	50
6.1 The Buying Firm (X).....	51
6.1.1 Innovation	51
6.1.2 Supplier Innovation	53
6.1.3 Managing Supplier Relationships and Innovation.....	55
6.1.4 Supplier Relationship Models.....	56
6.1.5 Configure supplier innovation – Cross-functional teams	59
6.1.6 Competition VS. Cooperation.....	61
6.1.7 Supplier satisfaction & preferred customer status	63
Market/ Industry characteristics.....	65
6.1.8 Supplier involvement – Risk exposure & safeguard measures.....	65
6.1.9 New Vs. Well-Established Supplier	68
6.1.10 Management Profile and Comfort Zone	71
6.2 Supplier Firms (Contextual Profiles)	72
6.2.1 Supplier A.....	72
6.2.2 Supplier B.....	74
6.2.3 Supplier C.....	77
6.2.4 Supplier D.....	82
7. Analysis	85
7.1 Supplier A - Strategic Partnership	85
7.1.1 Supplier B – Business Partnership “case-by-case” co-creation	86
7.1.2 Summary of the main points: Risk-return/ trade-off (Strategic Partnership vs. Business Partnership)	87
7.1.3 Supplier C – Durable arm’s length relationship	88
7.1.4 Supplier D – Arm’s length relationship	90
7.1.5. Summary of the main points: Risk return/trade-off (Durable arm’s length relationship vs. Arm’s length).....	91
7.2 Exploration vs. Exploitation / Radical vs. Incremental Innovation.....	92
7.3 New Vs. Well-Established Supplier	93
7.4 Management Profile and Comfort Zone	95
8. The conceptual framework revisited.....	98
9. Conclusion	101
9.1 Innovation Problem Solving.....	101
9.1.1 Managers Role.....	102
9.1.2 Concluding Remarks	104
9.2 Contribution to Academia.....	104
9.3 Managerial Implications.....	105
9.4 Suggestions for further research.....	106
10. References	108
11. Appendix.....	116
Appendix 1 - List of interviews	116
Appendix 2 - Interview Guide for Buyer	117
Appendix 3 - Interview Guide Suppliers.....	119

1. Introduction

The purpose of this opening chapter is to present the main ideas and reason behind the topic of this Master thesis. First, we present a background followed by a problem discussion. Subsequently, the research questions are introduced followed by delimitations and the purpose of the research.

1.1 Background

It is widely recognized that all companies face an increased global competition that have generated more complex supply chains (Soosay, Hyland & Ferrer, 2008). This implies continuous issues and challenges to reduce costs, enhance quality, and ameliorate customer service to respond to the new supply chain environment and stay competitive. Hence firms are compelled to restructure and strive for persistent innovation to increase effectiveness and customer satisfaction (Soosay, Hyland & Ferrer, 2008). This scenario can be illustrated by the arguments of Fine et al. (2002) that affirm, *“Every industry has its own clock speed — or rate of evolution — depending on its products, processes and customer requirements. Individual capabilities can lose value overnight, hastened by rapidly changing technologies, abrupt shifts in the larger economy or by the new tactics of competitors. The faster the industry clock speed, the shorter the half-life of any given competitive advantage”* (Fine et al., 2002 p.70).

Although it is not a new phenomenon, innovation has become an increasingly important element to boosting firms' business growth as a result of the current globalized market arena characterized by intense competition. For more than five decades ago, the management guru Peter Drucker affirmed that innovation is a fundamental element that firms use to build and maintain their competitive position in the market (Drucker, 1954 p.37, cited in Henke Jr & Zhang, 2010).

However, these precursors' innovation was created through internal resources and R&D, which is not sufficient for companies operating in today's business environment. Thus, companies cannot operate successfully and survive solely by

utilizing their individual resources (Wilkinson & Young, 2002; Wilkinson, Freytag & Young, 2005). All companies depend on cooperation with other companies and organizations, which enables access to the capabilities and resources they lack to develop a competitive advantage (Araujo, Dubois & Gadde, 1999; Wilkinson, Freytag & Young, 2005). This trend has risen the importance of new ways to innovate, which implies a shift from closed innovation to the concept of open innovation, which has attracted many writers over the past decade (Chesbrough, 2003a, 2003b; von Hippel & von Krogh, 2003; Von Krogh, Spaeth & Lakhani, 2003; von Hippel, 2005; Chesbrough, Vanhaverbeke & West, 2006; Laursen & Salter, 2006; for an overview see e.g. Dahlander & Gann, 2010; Van De Vrande, Vanhaverbeke & Gassmann, 2010; West and Bogers, 2011).

In this respect, Chesbrough (2003) argues that firms internal R&D no longer can be considered as the invaluable strategic asset it once was. This is due to a fundamental shift in how companies create innovative ideas and bring them to the market. In the past, companies employed the old model of closed innovation, which is based on the assumption that successful innovation requires control of the company and should be generated through internal ideas (Chesbrough, 2003a; 2003b). However, a number of factors has changed the society - e.g. human capital mobility -, as well as the economy - e.g. access to risk capital - which have eroded the previous solid model of closed innovation. This is in line with emerging competition from both well-established and new high-innovative firms (Chesbrough, 2003a). In line with these arguments Lee, Olson and Trimi (2012) argue that closed innovation based on internal R&D is not enough to stay ahead of an increased global competition since it is both too slow and costly. Consequently, the innovation has evolved from the previous closed innovation and paved the way for a more collaborative model of open innovation (Chesbrough, 2003a; Lee, Olson & Trimi, 2012). This implies a strategy that allows and facilitates knowledge sharing as well as technology transfer across the firm's boundaries (Gianiodis, Ellis & Secchi, 2010).

In this context, the supply chain is the company's lifeline providing various interfaces that are necessary to integrate relevant players as well as their ideas from the external environment (Brem & Schuster 2012 p. 67). Among these external players a firm's suppliers play one of the most important roles. According to Brem and Tidd (2012)

“hardly anybody outside any company knows its products and process better than its suppliers” (Brem & Tidd, 2012 p. xi). Moreover, Herzog & Leker (2011) claim that capable external suppliers are able to offer sufficient quality that even sometimes exceed the quality a firm can achieve internally. Thus, a firm does not need to execute every function of the value chain by their own (Herzog & Leker, 2011 p.24)

In fact, suppliers have been recognized to possess the largest innovation potential among the firm’s external actors and have shown the best result with regards to R&D collaboration and product innovation. This is because suppliers have a narrow knowledge about their buyer’s operations and specific needs, but also because it typically exist a mechanism for knowledge transfer between the parties (Yu, 2008; Henke Jr & Zhang, 2010; Un, Cuervo-Cazurra & Asakawa, 2010). Hence, in many industries, companies increasingly not only depend on the suppliers' manufacturing capabilities but have also recognized them as an important source for product and process innovation (Wagner & Bode, 2014).

Manufacturers strive to obtain larger benefits from their suppliers and involve them more deeply into product development and induce them to come up with continuous improvement of production processes. The goal is to seek more innovative products, faster product development, and lower costs (Dyer, 1996a; 1996b; 1996c). This is an ongoing trend where manufacturer less and less create value internally and instead rely more on their external environment and suppliers for value creation. Thereby, intensive integration of suppliers in the value-creation process is a key success factor for a company, especially in extremely competitive industries (Brem & Schuster, 2012 p. 67-84).

Several studies have demonstrated the importance of supplier innovation as an input for firms’ success and enhanced performance. A number of scholars have found that supplier integration in joint innovation projects generate benefits for the buyer firm (Petersen, Handfield & Ragatz, 2003) such as improved product quality and decreased project cost (Handfield et al., 1999; Gianiodis, Ellis & Secchi, 2010). Moreover, suppliers’ involvement also contributes to reduced drawbacks, hinders costly reworks and delays in the process of new product development. Equally important, suppliers’ know-how create advanced problem-solving solutions, better customer utility and state-of-the-art innovation (Petersen, Handfield & Ragatz, 2003, 2005; Bosch-

Sijtsema & Postma, 2009; Song & Thieme, 2009) In addition, based on previous studies regarding integration of suppliers in product development and open innovation, early and comprehensive supplier engagement paves the way for buyer firms' superior performance (Brem & Schuster, 2012 p. 68). Additionally, Lazzarotti, Manzini and Pellegrini (2010) found that companies that employ open innovation models can achieve improved performance, as a result from e.g. extended skills, competencies and creativity, shared risk and costs, technological aggressiveness, R&D intensity and radical innovation.

1.2 Problem Discussion

Although suppliers have proven to be one of the most important and successful sources of innovation, manufacturers attempts to involve suppliers in their innovation processes it is not without challenges. An extensive survey of industrial firms worldwide and their innovation with suppliers conducted by Handfield and Lawson (2007) can illustrate this phenomenon. In their study, one North American manufacturer described the difficulties of supplier innovation by using an interesting metaphor:

“Suppliers are like fish in the ocean. We (the buyers) are the fishermen. The key challenge facing us is how to put out the right bait, so that we can pull up the right suppliers at the right time and get them to help us develop our products. There are several problems associated with fishing: How do we know we're using the right bait? How do we know the right kinds of fish are in the water? Most importantly, when we catch a fish, how do we know whether it's the right fish, and whether we should keep it or throw it back in the water? Finally, how do we know the fish will follow through with its commitments if we decide to keep it?” (Handfield & Lawson, 2007 p. 45).

As a consequence of the suppliers' importance as an external input for innovation and its complex nature, there is a clear linkage between open innovation with suppliers and supply chain management (Brem & Schuster 2012 p. 67). In order to achieve successful open innovation firms must implement various strategies across the supply- chain for coordinating innovation activities and utilizing available benefits from suppliers in the most optimal way. Bouncken (2011) discusses the concept of supply chain innovation management which states that collaborative work and transfer of information up- and downstream the supply chain enhance innovation in the supply chain. The transfer of information improves and channels the activities of design, redesign, and innovation. In line with this discussion Herzog & Leker (2011)

argue that traditionally the issue of technology sourcing has addressed the question of whether innovate inside the firm or acquire it from the external sources.

Considering both as extreme options leads to the traditional make or buy decision. However, firms need to move beyond the make or buy dichotomy due to a growing complexity of decisions regarding sourcing of technology and firms' increasing need for cross-disciplinary R&D. The sources of innovation and technologies are multiple and dispersed in nature. Consequently, companies must utilize different methods to access the sources of innovation (Herzog & Leker, 2011 pp. 28-29). Therefore, it is challenging to understand how managers actually manage their up-stream sources of innovation in the complex environment and further balance the flexibility versus control as well as risks versus benefits.

Following open innovation strategy and the risks versus benefits, innovation requires new technologies, which is not currently accessible to the firms. Thus, firms strive for assessing external technology sufficient for solving complexities, which further involves higher risk – for example due to information asymmetries - than closed innovation options (Herzog & Leker, 2011 p. 114). However, the transaction cost can be high for technology recipient (buyer) due to the high level of knowledge from technological providers (supplier). Thus, the tacit nature of knowledge provides room for opportunistic behavior even though the supplier has no intention to cheat (Herzog & Leker, 2011 pp. 114-115). Nevertheless, managers should take the benefits in terms of potential competitive advantage and the risks involved due to possible knowledge spillover, when they collaborate with highly potential suppliers (Silverman, 1999).

Following open innovation strategy and control versus flexibility, in contrast to the science-based industries, where most of the knowledge and innovation derives from R&D facilities (Andersen & Drejer, 2008), in the engineering-based industries, the knowledge and innovation derives mostly from interaction with suppliers (Kamp, Smits & Andriessse, 2004). Thus, in the engineering- based industry field, in our case, the wind turbine industry, focal firms are in constant negotiations over critical issues in order to achieve effectiveness (Andersen & Drejer, 2008). Hence, such constituencies are often temporal in nature since actors involved in such negotiations have multiply changing interest. As firms learn from experience within inter-organizational relationships or from opportunities within their networks, interests and

constituencies also change in various contexts (Benson, 1975). Therefore, it is challenging to understand how managers actually create flexibility in all their external relationships and can at the same time control their supplier base in line with multiply changing interest. As Andersen and Drejer (2008) mention, despite the complexities and the benefits related to suppliers' innovation, it is interesting to understand how firms strive for managing these complexities in real-life activities for innovation and value creation (Andersen & Drejer 2008). The existing literature, mentioned in the background, frequently discuss the benefits of supplier innovation, but there exists limited researches that explain how firms exploit innovation by governing their external relations (Mahnke & Özcan, 2006). Based on our discussion we believe that supplier innovation becomes even more interesting in high-technological, engineering based industries such as the Wind Turbine Industry where the manufacturers' interaction with suppliers is one the main drivers for innovation and value creation.

1.3 Research Questions

Based on the former background and problem discussion we believe it is very intriguing to understand the concept of supplier innovation, and reflect upon how buyers actually manage their supplier relationship and handle the associated risks and benefits to obtain a successful open innovation. In order to analyze this interesting and the same time complex phenomenon, we have formulated some exploratory questions:

The main question

How do buyers (manufacturers) involve suppliers in open innovation in order to achieve competitive advantage?

In order to better understand the strategies used and more clearly pinpoint their implications for value creation and innovation potential, we have set three sub questions;

Sub Question 1. How open innovation is linked to various types of inter-organizational relationships?

Sub Question 2. How do buyers handle the balance between simple vs. complex innovation and new vs. well-established supplier relationships in order to achieve the optimal configuration?

Sub Question 3. What are the pros and cons / risk return - trade-offs?

1.4 Delimitations

With regard to the scope and potential of our topic, it generates a wide range of possible research directions. Hence, we need to set up several delimitations in order to keep the research concentrated on the core issue, which first and foremost makes the study feasible, but also makes it understandable for external readers. The main reason behind our delimitations is due to the timeframe given for conducting this research and the extensive nature of the topic and its related problems and complexities.

First our models are based on the various literature discussing supply-chain management, inter-organizational relationships and innovation and will handle the most suitable cooperation strategies for our research purpose and topic. All the governance models will include different types of relationship settings for innovation creation. In this regard, our goal is to investigate the pros and cons of each unique form of governance, which are made up of different features that will be more or less applicable in various situations.

However, even though value appropriation is an interesting topic for creating incentives in relationships, there are different types of property rights for appropriating value, which involves a wide range of complexities and cannot be managed within our limited time frame. Therefore, we limit our research with regards to value appropriation, and instead focus on value creation between buyer-suppliers for innovation as the primary research focus. Nevertheless, the value created and the value appropriated in an inter-firm relationship represent two sides of the same coin (Wagner, Eggert, & Lindemann, 2010). Thus, we touch upon value appropriation because it is directly linked to value creation, and is a major underlying factor for creating suppliers' motivation. In other words, we will not analyze how partner secures its larger share of the pie. Although, we assume that all partners will be able to acquire some part of the relational rent. This is certainly dependent on different contextual factors, for example, the bargaining power in relationship, the amount of investment in the relationship, their position in the network and etc.

Furthermore, open innovation created in supply chain generally implies coordination of both up-and-downstream actors. However, our focus will be on the upstream part of the supply-chain and the suppliers. Therefore we have excluded downstream part

of supply chain that involves the customers - i.e. user innovation. It is notable to mention that customers in general provide manufacturer with voluntary open innovation actions in more natural way than upstream players - i.e. suppliers - due to existing of more clear mutual benefits (Felin & Zenger 2014). Therefore, the pressure on focal firms to involve downstream actors to do innovation is less problematic than upstream activities. For example, the complexity of intellectual property rights is less problematic in downstream part as it is within upstream relations (Felin & Zenger 2014). Nevertheless we may briefly discuss end-users in our thesis as their inputs can create directives regarding innovation that the focal firm has to forward to its suppliers.

Finally, our aim is to investigate how managers utilize suitable models in a real-life context and involve supplier for innovation. This involves a broad range of internal and external contingency factors that will influence managerial decision-making. Nevertheless we cannot cover all contingency factors involved; therefore we will focus on limited number of factors that we believe have the most influence with regards to value-creation and innovation in a buyer-supplier relationship. These factors will be discussed in more detail later in the thesis.

1.5 Research Purpose

Our aim with this research is not to invent new theory; rather we want to combine different theories into an integrative theoretical framework that is novel and that in a more comprehensive way demonstrates the concept of open innovation in relation with suppliers. More specifically we want to understand how buyers (manufacturers) utilize different types of relationships with their suppliers and thereby involve them into their innovation process in various ways in order to obtain a competitive advantage

Our thesis will employ multiple sources from various actors involved in the Danish wind turbine industry to build a case study. Based on this specific case, we will contribute to the ongoing research on innovation and value creation within inter-organizational supplier-buyer relationship. In addition to the academic contribution, our purpose is also to explore the practicality of various strategies that managers employ in real-life context. We hope to offer a practical framework for managers

working in high-tech industries. Additionally, the wind turbine industry is distinguished from science-based industries such as pharmaceuticals and can be seen as engineering based type of industry, similar to the automotive industry (Andersen & Drejer 2008). Thus, our findings can be relevant for managers active in other innovation-intensive industries outside the wind turbine industry.

All aforementioned views on collaborative practices for knowledge sharing and distributed co-development activities have focused specifically on the nature of the knowledge and have neglected the importance of the complexity regarding underlying interest in collaborative buyer-supplier relationship. This problem becomes even more challenging in the industry which is characterized by changing demands and processes (Andersen & Drejer 2008).

The remained challenge is to see how these changes in the wind Turbine industry affect the players' interest when they collaborate in distributed innovation activities. In this respect, one main question arises: how firms pinpoint suppliers' interest and involve them in innovation creation, considering the risks and benefits involved in these activities? This is necessary since organizing innovation activities is highly relevant in order to optimize innovative output and to strengthen firms' competitiveness (Felin & Zenger, 2014).

Furthermore, we focus on the innovation "problem" as the central unit of our analysis. Different problem types - i.e. complex (radical innovation) or simple (incremental innovation) - match different open innovation governance models (or forms). Furthermore, different governance models brace alternative solution search strategies when firms will involve supplier for obtaining innovation. In all, our aim is to provide a comparative framework for managing innovation, where we discuss pros and cons of open innovation governance models with respect to upstream activities i.e. suppliers. Our aim is not to be exhaustive in explaining the full set of available governance models, instead our aim is to re-create open innovation models, by bundling internal hybrids and different categories that create substantial distinction within the different governance options (Felin & Zenger, 2014). In this way, we want to simplify governance models for managers by presenting our open innovation governance models.

Our contribution is demonstrated in our conceptualization process, where we discuss the ambidexterity between our two main dimensions; radical vs. incremental innovation and new vs. well-established suppliers, which together establish a strong analytical framework. We only focus on value creation and cannot determine the most optimal option, since the manufacturers' decision making is dependent on the company's risk profile. Our conceptual framework is novel since it demonstrates how the buyer firm can engage potential, new versus well-established supplier for solving simple versus complex innovation problems. There are lots of articles that discuss how to involve suppliers and provide good -advices from different perspectives, which still create confusion about this subject.

Therefore, it is important to study supplier involvement for innovation creation in a more holistic way and understand what is less or more important. In this respect, there is no co-emerging framework regarding how buyers involve suppliers in innovation. Hence, our main contribution is to articulate an analytical framework, which will simplify this confused universe.

As mentioned, we have been amazed but at the same time confused by the literature since the various articles go towards different directions. Thereby, we believe that there is a research gap in terms of providing a simple, analytical framework, which is our aim to accomplish by applying an eclectic approach. Hence, our contribution will be achieved by analyzing the various literature i.e. innovation theory, organizational learning theory, resource based theory and transaction cost perspective – bringing in important elements and ideas and put it in one single phenomenon. Our framework is not about the best strategy; it's rather a landscape of various options available for managers depending on contextual factors i.e. company's risk profile and suppliers' potential benefit. Hence, our literature framework presents the ways to involve supplier in innovation generation in the case of wind turbine industry.

1.6 Research Outline

Theoretical Framework

This chapter outlines the literature and theories that build our conceptual model. The literature review starts by introducing basic definitions of innovation and open innovation, followed by contingency factors, which has substantial importance to our research. Finally we elaborate on different aspects related to buyer-supplier relationships.

Conceptual Framework

In this chapter we develop our two-dimensional conceptual model (simple vs. complex innovation and new vs. well-established suppliers) based on the literature review. By combining the nature of innovation and the nature of relationship, the model creates four different quadrants, all containing a unique type of relationship.

Methodology

This chapter contains an overview of the research methods used in the research process. Specifically, it explains in detail the chosen research approach, the gathering of empirical data, and the analytical procedure, which were utilized in order to assure credibility and high validity throughout the research.

Empirical Background

In this chapter our aim is to explain the trends and existing features of the wind turbine industry in order to provide readers a holistic view of the industry for better understanding of the empirical as well as analytical part of our study.

Empirical Findings

This chapter clarifies our empirical findings where we absorb our respondents' expertise and experience based on a dyadic perspective. This part of our work will aid us to understand how the buyer firm manages its supplier relationships in real-life context for improved competitiveness and what supplier believes is important for innovation creation.

Analysis

In the analytical chapter, we analyze the result from the empirical findings and our theoretical framework in order to understand how managers can balance between different ambidexterity dimensions in order to control their supplier base, and the risk as well as benefits involved.

The conceptual framework revisited

In this chapter we confront our initial conceptual model based on the empirical findings and the analysis in order to discuss and elaborate the contradictory aspects and make a revised conceptual model.

Conclusion

In this chapter our aim is to conclude our research and understand how buyers involve their suppliers in an open innovation context in order to obtain competitive advantage. Thus, the final result from our empirical findings and analysis will be discussed in this chapter to answer our research questions.

2. Literature Review

In this chapter we outline the literature in the field of buyer-supplier relationships and open innovation management. We start the literature review starts by introducing the most significant definitions of the concept of innovation. Furthermore, we discuss factors we believe are important for understanding managerial implication when managers decide to outsource. Continuously, we explain the essential factors behind supplier segmentation which aid us to articulate our conceptualization model.

2.1 The concept of Innovation

Innovation is a very broad concept that can imply things from scientific inventions to technological breakthroughs leading to new patents, but also more simple improvements. Hence, it exists vast number of different definitions (Lee, Olson & Trimi, 2012). The innovation definition used often differs between theory and practice, but also within the field of theory where different scholars use different definitions depending on the particular research issue (Herzog & Leker, 2011 p. 9). A broad and generally accepted definition of innovation is from the Oslo Manual that affirms: “An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations” (OECD, 2005 p. 46).

Furthermore, the manual sets a minimum requirement of an innovation, which argues that the product, process, marketing or organizational method should be new or significantly improved for the company (OECD, 2005 p. 46).

Innovation is directly linked to value creation. According to Felin & Zenger’s (2014) definition, innovation is a process “*by which existing knowledge and input are creatively and efficiently recombined to create new and valuable outputs*” (Felin & Zenger, 2014 p. 915). Here, the definition of innovation emphasizes the importance of recombined input of knowledge for value creation.

In this paper we focus mainly on the definition by Lee, Olson & Trimi (2012) who state that “*innovation includes any new idea or approach that is applied in*

fundamentally different ways to create value for the organization and other stakeholders such as customers, suppliers, partner organizations, communities, governments, or even general good of humanity. Thus innovation is directly tied to value creation” (Lee, Olson & Trimi, 2012 p. 818).

However, irrespective of definition chosen it is important to distinguish between different types or classifications of innovation related to improve for example the products or processes concerned. One of the most commonly used and accepted classifications system of innovation, used in both the literature and innovation management field refers to the level of innovativeness. In this respect, it is possible to differentiate between two extreme types of innovation – incremental and radical innovation (Roy, Sivakumar & Wilkinson, 2004; Herzog & Leker, 2011 p. 10).

Explained simply, an incremental innovation is an improvement within the given frame of solutions, whereas radical innovation is a change of the frame. Consequently, the primary difference between incremental and radical is whether the innovation is a continuous modification and improvements of previous innovation or it is new, unique, and discontinuous (Norman & Verganti, 2012).

However, in spite of the definitions for incremental and radical innovation, the perception of the two concepts and their implication may differ even among actors in the same industry. This is due to the subjective viewpoint of different firms. Consequently, what one company considers as radical innovation based on its portfolio of existing products or services, markets, and business model, can instead be perceived as incremental innovation by another company (Hurmelinna- Laukkanen, Sainio & Jauhiainen, 2008).

2.2 The concept of Open Innovation

The term of open innovation has been widely discussed in literature and multiple definitions has been suggested by various scholars (see for example Brem & Tidd, 2012 for an overview). However, one of the first and most known definitions is coined by Chesbrough (2006) who defines the concept of open innovation as follows:

“The use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively. Open Innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology” (Chesbrough, Vanhaverbeke & West, 2006 p. 1).

A more narrow definition of open innovation by Perkmann and Walsh (2007) who contend: *“Innovation can be regarded as resulting from distributed inter-organizational networks, rather than from single firms”* (Perkmann and Walsh, 2007 p. 259). The definitions above demonstrate the importance of inter-organizational networks for absorbing the external ideas and innovation creation.

However, in this thesis we follow the definition of Narasimhan & Narayanan (2013) who contend that innovation is *“the process of making changes to products, processes, and services that results in new value creation to the organization and its customers by leveraging knowledge efforts of the firm and (or) that of its supply network partners”* (Narasimhan & Narayanan, 2013 p. 28)

2.3 Inter-organizational relationship and innovation generation

As previously mentioned, we focus on innovation generated through buyer-supplier relationships in an open innovation context. Hence, we rely on some underlying theories for our arguments and assumptions. According to the resource-based view firms are bundle of tangible and intangible resources and capabilities acquired from both internal and external sources, which differ across firms as well as industries, and persist over time (Wernerfelt, 1984; Penrose, 1995). Thus, firms’ access to valuable, rare, imperfectly imitable and non-substitutable resources transfers a short-run

competitive advantage into a sustained competitive advantage (Barney, 1991; Grant, 1991). The access to unique resources, as well as the interactions with others to obtain sustainable competitive advantage, is highly associated with the concept of open innovation (Herzog & Leker, 2011 p. 83).

Moreover, in the opinion of the relational view (Dyer & Singh, 1998) and organizational learning theory (Hult et al., 2000) the inter-organizational relationship, i.e. the buyer-supplier relationship is the locus of innovation generated through efficient learning (Powell, Koput & Smith-Doerr, 1996; Jean, Kim & Sinkovics, 2012). Consequently it can be argued that innovation generated in buyer-supplier relationships derives from the application or utilization of external supplier knowledge to create innovation for new or improved products or processes in the exchange relationship (Jean, Kim & Sinkovics, 2012). These arguments are in line with the knowledge-based view that stress significance of knowledge application and integration to create innovation (Grant, 1996a, 1996b). Moreover, the relational view considers inter-organizational relationship, i.e. the buyer-supplier relationships as a source of competitive advantage. This since critical resources are embedded in inter-firm resources and routines. Hence, a prerequisite to achieve competitive advantage is a successful inter-organizational relationship in which relational rents are jointly created and preserved through dyads and networks relations (Dyer & Singh, 1998).

The relational rents created in buyer-supplier relationship can be defined as “*a supernormal profit jointly generated in an exchange relationship that cannot be generated by either firm in isolation and can only be created through the joint idiosyncratic contributions of the specific alliance partners*” (Dyer & Singh, 1998 p. 662). These relational rents comprise joint innovation generation, problem solving (Clauß, 2012) and knowledge-sharing with performance-enhancing technology as the final outcomes (Dyer & Singh, 1998).

Based on the literature, knowledge can be divided into two types; (1) information and (2) know-how. They differ significantly in their nature; hence information is easily codifiable knowledge that can be transmitted. On the contrary, the know-how involves knowledge that is tacit, “sticky”, complex, hard to codify, difficult to mimic, and is more likely to generate sustainable advantages. In order to successfully transfer

know-how, firms need to employ an interactive process of exchange, which is characterized by direct, intimate, and extensive face-to-face communication (Grant, 1996a; Dyer & Singh, 1998).

2.4 The Importance of Supplier Innovation

Gianiodis, Ellis and Secchi (2010) contend that firms who employ open innovation can decrease the internal R&D costs, while they are able to expand the scope of innovation. In this regard, focal firms have been encouraged to transcend their boundaries through knowledge and technology sourcing for improved value creation. Indeed, greater openness in outsourcing is a precondition for value-creation due to innovation complexities in line with increased demand from end-users and penetrability of firm's boundaries that progressively increase. This demonstrates the need for focal firms to simply interact with external partners in more open ways (Felin & Zenger, 2014).

Additionally, suppliers play an important role as an essential part of the supply chain, since they are valuable sources of innovation. Hence, suppliers demonstrate a “real-case” application of open innovation (Brem & Schuster, 2012 p. 67). This is not just a fact in industries where open innovation has been used very prevalent since companies collaborate very closely with suppliers for innovation generation. Thus, supply chain management can be seen as an important mechanism for open innovation in order to access potential idea providers i.e. suppliers. This is due to the fact that suppliers progressively shift their position to become initiators of innovation, instead of just being raw material providers (Brem & Schuster, 2012 p. 68).

Several studies have demonstrated the importance of supplier innovation as an input for firms' success and enhanced performance. A number of scholars have found that supplier integration in joint innovation projects generate benefits for the buyer firm (Petersen, Handfield & Ragatz, 2003) such as improved product quality and decreased project cost (Handfield et al., 1999; Gianiodis, Ellis & Secchi, 2010). As previously mentioned in the background, suppliers' involvement also contributes to reduced drawbacks and hinders costly reworks and delays in the process of new product development. Equally important, suppliers' know-how create advanced problem-

solving solutions, better customer utility and state-of-the-art innovation (Petersen, Handfield & Ragatz, 2003, 2005; Bosch-Sijtsema & Postma, 2009; Song & Thieme, 2009) In addition, based on previous studies regarding integration of suppliers within product development and open innovation, early and comprehensive supplier engagement paves the way for buyer firms' superior performance (Brem & Schuster, 2012 p. 68; Handfield & Lawson, 2007).

2.5 Managing supplier involvement and solving innovation problems

As previously affirmed, companies that employ an open innovation approach and involve their supplier into an innovation creation process can reap the benefits of multiple advantages. Nevertheless, this also implies that firms will also face various complexities that must be managed effectively. As globalization increases, achieving successful inter-organizational relationship becomes more challenging and complex outside the firm's boundaries. Hence, focal firms are in need for both firm-internal and firm-external governance modes in order to limit the risks and uncertain outcome, which might occur (Kamath & Liker, 1990; Ørberg Jensen & Petersen, 2013). Hence, the management of relationships become more complex and challenging for managers since they have to control at higher levels of both cross-functional – i.e. marketing, engineering and sourcing groups –, and cross-locational – i.e. buying locations – in order to fulfill expected demand (Trent & Monczka, 2005).

Consequently, despite the potential high return contributed from suppliers many international firms fail to achieve the expected benefits mainly due to the high risk involved. The risk is especially high for firms collaborating with suppliers with high technological knowledge capable for solving complex problems. Hence, many firms undertake various specific investments both internally and externally in order to minimize the transaction cost, create value and secure the benefits gained from technology providers (Herzog & Leker, 2011 pp. 114-115; Ørberg Jensen & Petersen, 2013). Moreover, if we consider suppliers and end-users, value creation across the value chain is a challenge for focal firms since boundaries of values between production and consumption are highly overlapping (Brem & Schuster, 2012 p. 68)

In order to obtain relational rent and innovation it is argued that the four fundamental determining factors must be fulfilled; 1) Inter-firm relational specific assets, 2) Inter-firm knowledge-sharing routines, 3) Complementary resource and capabilities, and 4) Effective governance. The governance structure is a key factor for creation of relational rent since it either minimizes the transaction costs or generates incentives for value creation initiatives (Dyer & Singh, 1998). Consequently, it is required that manufacturers develop their agreements and contracts, and standardize their supply management processes and practices on a worldwide basis (Trent & Monczka, 2005).

However, controlling the existing relationships is not only achieved by development of formalities. According to several scholars, focal firms have to attract suppliers with necessary know-how and satisfy these suppliers by pinpointing their interest for value creation. These actions will hinder opportunistic behavior and aid manufacturers to become customer choice of industry, and solve the complex innovation problems through involvement across various relationships (Hüttinger, 2010; Hüttinger, Schiele & Veldman, 2012).

2.6 Managing contextual factors in open innovation

According to contingency theory (Galbraith, 1973; Lawrence, Lorsch & Garrison, 1967; Donaldson, 2001) organizations are open systems reacting to shifts in their environment (Forker & Stannack, 2000). In this environment there is no best practice of how to organize, as one method of organizing may not be equally effective under different conditions. Thus, focal firms must structure their operations in accordance to changing contextual factors, i.e. contingencies must be considered in order to obtain the optimal performance and handle arising implications (Lawrence, Lorsch & Garrison, 1967; Thompson, 1967; Drazin & van de Ven, 1985; Donaldson, 2001; Bahemia & Squire, 2010). These contextual factors are situational variables of either exogenous or endogenous nature that managers in the focal firm encounter (Bahemia & Squire, 2010). Consequently, only when managers are aware of the context-related factors, the most suitable management strategy for open innovation can be identified (Schewe, 1994; Herzog & Leker, 2011 p. 27).

In this respect, Bahemia & Squire (2010) conceptual framework for open innovation regarding new product development projects suggests three endogenous contextual factors of great impact: 1) the type of innovation (incremental or radical), 2) product complexity (discrete or complex), and 3) appropriate regime (strong or weak). In order to respond to these contingency factors managers must use response variables, which is the managerial actions taken to calibrate the uncertainties. For this purpose three dimensions is suggested for calibration: 1) the breadth dimension, i.e. the range or number of different external parties to involve in the innovation process. 2) the depth dimension, i.e. the depth of relationship with the external partners. 3) the ambidexterity dimension, i.e. the balance between developments of new or long-term relationships (Bahemia & Squire, 2010). A comparable suggestion of dimensions for supplier involvement in innovation processes is by Aune & Gressetvold (2011). In a similar vein the authors present the degree of cooperation (depth) between the buyer and supplier, and the scope of supplier involvement (breadth) in the innovation process.

2.7 The Key dimensions in our study

Based on the former discussion and our research purpose, we believe that the nature of innovation - i.e. incremental versus radical innovation - as well as the relationship dimension factors - i.e. the depth and breadth - and ambidexterity dimension are the main context-related factors influencing the ways to involve supplier in innovation.

2.7.1 The nature of the problem

Rather than focusing on the process of the problem, Felin and Zenger (2014) focus on how problems are professionally solved when they are identified and formalized. They mention problem complexity and the hiddenness of disperse knowledge as key attributes of problems for selecting most relevant governance strategy. Complex problems require firms to understand the pattern of interaction, and thereby need to choose relevant knowledge for solving the issue. This requires not only substantial interdependencies among the key suppliers and solution design choices, but also demands different governance approaches since the nature of these interdependencies

is not well articulated. In this case, theory-based search (i.e. entrepreneurs, managers and firms engage particularly when pursuing novelty and innovation) is used which requires identification and integration of the applicable knowledge that the firms want to explore. Therefore, it is necessary to support theory-driven search, which is a more centralized governance approach, unnecessarily costly, but supports broad knowledge exchange and creative knowledge recombination.

By contrast, regarding the simple, decomposable problems, the value of solution is not strongly shaped by interaction alternatives and relevant knowledge. This will allow a broad range of problem solvers i.e. suppliers, who possess the knowledge they deem as relevant to participate. Furthermore, firms are in need for more independent, directional search design (i.e. simple trial and error) as well as separate knowledge for generating higher value solutions. Unlike the theory-based research, governance approach in this case is more decentralized where autonomous search are preferred. In short, Felin and Zenger (2014) state that, *“As problems become more complex, the firm adopts governance that facilitates the extensive knowledge sharing required to form theories and heuristics to guide solution search. By contrast, as problems become simpler, the firm adopts governance that motivates more autonomous trial and error search based on local knowledge”* (Felin & Zenger, 2014 p. 917).

2.7.2 The nature of the knowledge

According to Felin & Zenger (2014) hidden knowledge has extensive bearing on solving innovation problems and how manufacturer controls its solution search for finding suitable suppliers. In this regard, Bill Joy, the Sun Microsystems founder’s states that *“most of the smartest people work for someone else”* (Felin & Zenger, 2014, p. 917) which demonstrates the dispersed nature of knowledge. This rises difficulties for managers when they are unaware where the relevant knowledge is – who has it or where it is located since they cannot make contract for it or buy it. As a solution, they need to widely broadcast a problem with hope that those with valuable solution will reveal themselves. Further, they need to stimulate a self-revelation process by inviting, and motivating suppliers holding the relevant knowledge to self-identify themselves. In this way suppliers will provide solutions for innovation

problems at hand. By contrast, when location of knowledge is known, the governance is more straightforward, in which managers can centrally identify the relevant knowledge for specific problems and acquire or hire it. For instance, simple invitations and compensation in form of licensing agreements or employment contracts are adequate for disclosing the necessary knowledge. It is notable that even though managers know where the hidden knowledge is, it may still remain hidden since the suitable suppliers are not enough stimulated to reveal themselves. Thus, inducing a process for self-selection and motivating relevant actors by for example compensation is a prerequisite for solving innovation problems. Felin and Zenger (2014) claim that *“As problems require hidden knowledge to solve, the firm adopts governance forms that widely broadcast problems, and relevant knowledge is then self-revealed rather than centrally identified by the focal firm”* (Felin & Zenger, 2014 p. 917).

2.7.3 Exploration and Exploitation

According to the Knowledge based view, innovation generation in a supply chain context incorporates processes of both knowledge exploration and exploitation (Jean, Kim & Sinkovics, 2012). March (1991) clearly distinguishes between the two terms exploration of new opportunities and exploitation of old certainties. March (1991) defines exploration as *“search, variation, risk taking, experimentation, play, flexibility, discovery and innovation”*. In contrast, exploitation is *“refinement, choice, production, efficiency, selection, implementation and execution”* (March, 1991 p. 71). From an organizational learning perspective and in more simple words, the distinction between exploration and exploitation can be seen as the invention of a new technology or the refinement of an existing one (March, 1991). Thus, exploration can be linked to radical innovation and exploitation to incremental innovation activities (Herzog & Leker, 2011 p.48).

Although exploration and exploitation represent different innovation strategies that a company utilizes to achieve prosperity and competitive advantage, they are also highly complementary (Ørberg Jensen & Petersen, 2013). According to March (1991) a company requires an appropriate balance between the two concepts due to the trade-

off. An excessively portion of exploration without exploitation will generate high experimentation costs without correlated benefits. In contrast, too much exploitation in the absence of exploration will lead to a suboptimal equilibrium (March, 1991; Ørberg Jensen & Petersen, 2013).

Exploration activities are usually based on tacit knowledge and not easily codified. This is especially the case for activities based on intensive technologies, “*where the understanding of problems and solutions are defined and redefined through iterative, coevolutionary work processes*” (Ørberg Jensen & Petersen, 2013 p.75). Thus, this type of exploration activities require a high level of expert knowledge and skills to define or formulate problems and find its solutions (Ørberg Jensen & Petersen, 2013). Hence, this type of complex innovation problems based on knowledge exploration and generation, necessitates the supply chain as a craft of learning, utilized to transfer and absorb the parties' knowledge bases (Jean, Kim & Sinkovics, 2012). In contrast, exploitation activities are more simple and basic in nature as they are based on improvement of already existing technologies or products. Thus, the focal firm can more easily predefine problems and their solutions for these activities, which then can be delegated to external parties along with explicit specifications (Ørberg Jensen & Petersen, 2013). Consequently, this type of activities is about knowledge exploitation and application that points to a kind of knowledge sharing, where focal firm access its partners stock of knowledge in order to exploit complementary knowledge to solve the innovation problems (Jean, Kim & Sinkovics, 2012). Given the distinctive features of exploration and exploitation, there must be a match between the nature of the problem (complex or simple) and the applied solution (standardized or fuzzy/unknown) for a successful outcome (Ørberg Jensen & Petersen, 2013). Linked to the dimensions of exploration and exploitation is also the level of managerial control employed by the focal company towards its suppliers, which includes the level of directives for problem definition and solution (Ørberg Jensen & Petersen, 2013).

2.7.4 New vs. Well-established Supplier

By drawing on March's (1991) work on exploration and exploitation, various scholars have recently made parallels to the practical advantages of ambidextrous inter-organizational relationships, which implies including both new untried and existing

well-established suppliers in the firm's alliance network for open innovation (Lin, Yang & Demirkan, 2007; Tiwana, 2008; Bahemia & Squire, 2010)

In order to solve complex innovation problems an integration and synthesis of complementary and diverse specialized knowledge is generally required (Henderson & Clark, 1990; Nickerson & Zenger, 2004; Tiwana, 2008). Integration refers to the process of jointly applying specialized knowledge possessed by the alliances parties. Thus, an efficient integration requires the parties to access and utilize each other's specialized knowledge (Grant, 1996a, Tiwana, 2008). Moreover, for a successful solution outcome, companies need novel recombinations of ideas, resources, and knowledge (Tiwana, 2008). However, to evaluate and apply these requirements in relation to well-established versus new untried supplier, may be complex for the buyer.

Tiwana (2008) argues that collaborating partners with strong ties (i.e. a long-standing relationships) have stronger capacity to implement innovative ideas, but at the same time an inherently lower capacity to generate innovative ideas. In contrast bridging ties (i.e. establishment of new relationships) has greater capacity to generate new innovative ideas, but suffer from a lower capacity to implement the ideas. Thus, the buyer face a trade-off situation, the potential of novel ideas may be lost due to strong ties, but the potential to integrate and realize the novel knowledge may be missed by bridging ties (Tiwana, 2008). Consequently, to invite suppliers from the existing network for innovation may not always be the best strategy. Sometimes, an innovation problem requires that the buyer initiate new supplier collaboration with the "right" complementary knowledge for successful solutions (Lau, Tang & Yam, 2010; Rosell, Lakemond & Wasti, 2014). In addition to the fact that an existing supplier may lack the required knowledge, it may also be the case that the supplier provides the buyer with ideas of incremental innovation in order to protect the value of its existing resources and previous investments (Lau, Tang & Yam, 2010). Thus, if the buyer firm limits itself to only utilize suppliers from the existing network it may restrict the opportunities to develop highly innovative solutions (Lau, Tang & Yam, 2010).

A well-established supplier and its relationship to the buyer have generally an already high level of relational embeddedness or strong ties, which implies trust, reciprocity

and proximity of interaction that is beneficial for information flows and knowledge integration. Moreover, the parties usually have a common language that enhances the capacity to absorb novel ideas from each other's bank of specialized knowledge (Tiwana, 2008), which is important as the knowledge is often of tacit nature and therefore not easily communicated (Gulati & Singh, 1998). There is also likely that the parties share the same values, cooperative norms, and reciprocity in the relationship, which is important for knowledge transfer and subsequently knowledge integration. Reciprocity also lowers the parties' cost-benefit calculation before contributing with proprietary or valuable knowledge into the innovation project and increases the motivation of investment in time and resources (Tiwana, 2008). Furthermore, the longer time the relationship between the parties last, the bonds of trust and commitment become stronger, which binds the buyer and supplier into a close and collaborative relationship (Sriram & Mummalaneni, 1990; Ro, Liker & Fixson, 2008). Thus a well-established relationship involves stronger trust, which is important for joint innovation problem solving (Tiwana, 2008).

Nevertheless, despite all the positive aspects mentioned regarding partnerships with strong ties it may imply a backlash. This since the parties often are more homogenous and therefore likely possesses redundant knowledge that can impede novel ideas. In contrast new partners (weak ties) are more heterogeneous in nature and will therefore likely possess more diverse knowledge, ideas and perspectives. This extends the repertoire of available solutions and the probability to generate novel innovation ideas (Tiwana, 2008).

It has been shown that a high level of relational embeddedness or strong ties between collaborating partners is highly crucial, since it contributes to increased cohesiveness (Gulati & Singh, 1998), enhanced reciprocal assistance (Hansen, 1999) better communication effectiveness (Dyer & Singh, 1998), facilitate knowledge transfer, and lower opportunistic behavior such as withholding of knowledge (Tiwana, 2008). Thus, strong ties and a high level of relational embeddedness between the parties in innovation alliances will enhance the knowledge integration, as a result of the synergistic recombination of specialized knowledge, which will generate unique novel solutions and realize relational rent (Dyer & Singh, 1998; Tiwana, 2008).

However, despite that new external partners (bridging ties) enable the focal firm to access new expertise, perspectives and capabilities, which increase the probability of recombination of specialized knowledge for generation of new innovation, it may be hard to realize it due to the parties' dissimilarity. New external parties (weak ties) can give rise to action problems, as they possess different expertise and perspectives, and often communicate differently (Tiwana, 2008). The more heterogeneous expertise and perspectives the parties have, the more difficult it can be to realize a recombination of their knowledge into innovation. Consequently, the benefits of a high-level of specialized knowledge can lose its value since it cannot be effectively recombined and exploited (Tiwana, 2008). This since the ability to exploit the knowledge is dependent upon the parties' absorptive capacity (Cohen & Levinthal, 1990; Szulanski, 1996), which is likely to be absent in new relationships, i.e. bridging/weak ties (Hansen, 1999; Tiwana, 2008). Moreover, parties with different knowledge and skills are generally embedded in different professional and social networks, which seldom share similar norms, culture and business vocabulary that facilitate transfer of knowledge (Powell, Koput & Smith-Doerr, 1996). Hence, it may be problematic to frame the knowledge and make it comprehensive for the other party, and thereby difficult to integrate it. The result is an inherent risk of a lack in the development of a shared understanding of the innovation problem, and subsequently difficulties of coordination of application and specialized knowledge for joint problem solving (Tiwana, 2008).

However, there is evidence of companies that successfully developed complex innovation together, e.g. new products with new untried external partners instead of relying on existing well-established ones. As an example, Nokia during the years 2001-2002 employed an open innovation strategy, in which roughly 88 percent of the external innovation partners were completely new (Dittrich & Duysters, 2007; Dittrich, 2008). Moreover, Lin, Yang & Demirkan (2007) argue that ambidextrous alliances composed of at least 20 percent of new partners will give rise to superior and increased radical innovation outcomes. This demonstrates that new untried external parties, even in the cases of complex innovation can be successful (Lin, Yang & Demirkan, 2007).

2.8 Supplier Segmentation and Supplier Interface

As a result of the competitive market in many industries companies have been forced to enhance their business activities and resource allocation in order to maintain their market share, turnover and profitability. Thus, corporate resource allocation is a crucial activity to stay competitive and companies continuously restructuring and re-engineering their business processes, where supplier segmentation is one fundamental activity to improve the competitive position (Svensson, 2004). This since supplier segmentation aids firms to balance their portfolio of relationships and give a holistic picture regarding how a firm can manage one type of relationship from another (Bensaou 1998). The buyer's segmentation of its suppliers can be based on various generic criteria such as the type of supplier, type of logistic flow, and the type of relationship (Svensson, 2004). However, there exist a wide number of different supplier segmentation models that all use different dimensions of classifications (c.f. Dyer, Cho & Chu, 1998; Kaufman, Wood & Theyel, 2000; Svensson, 2004). What all of them have in common is a model based on two dimensions divided into low versus high categories, which create four different supplier profiles. In this respect, parameters such as the buyer's and supplier's specific investments (Bensaou, 1999); technology and collaboration (Kaufman, Wood & Theyel, 2000); commodity's importance to buyer and supplier's commitment to buyer (Svensson, 2004) are used to segment the supplier network into different categories.

2.8.1 Supplier Categories

Kaufman, Wood & Theyel (2000) distinguish between four distinct supplier strategies. 1) Commodity supplier (low collaboration / low technology) – suppliers with products based on standardized technologies that relate to their customers through standard market contracts. The suppliers typically compete through low costs and design and manufacture products “out of the catalog” that targeting generic customers for the whole market. Due to the limited specialized investment from both supplier and buyer both parties are independent and have low switching cost (Kaufman, Wood & Theyel, 2000). This is in line with Bensaou's (1999) Market-Exchange Profile and Svensson's (2004) Transactional Supplier. According to these

concepts, these suppliers are characterized by highly standardized products which are based on simple and mature technology that require minor supplier expertise due to low level of technological innovation or frequent changes in design. Usually the buyer can easily find numerous suppliers with the necessary skills on the market for this product and the business requires limited capital investment and small innovation capabilities. Thus, the upstream market is characterized by high competition with many small independent suppliers that compete for orders in a saturated market. Since neither of the parties develops any major specialized investment, the switching cost is low and both parties can easily turn to the market to shift business partner (Bensaou, 1999; Svensson, 2004).

2) Collaboration specialist (high collaboration / low technology) – suppliers with products based on standardized technologies that meet customer specifications. The supplier develops collaboration techniques in order serve its buyer's current and future needs. As the supplier follows the detailed design control of its buyer, it makes limited investment into innovation for product and process technology. Thus, the degree of dependency is relatively low and both parties can turn to the market for another business partner (Kaufman, Wood & Theyel, 2000). This is somewhat similar to what Bensaou (1999) determines as Captive-Buyer Profile and Svensson's (2004) Friend Supplier, which involve more complex products than the market exchange relationship. Such products require some customization but are still based on rather simple and stable technology. However, in contrast, Bensaou's upstream market is characterized by high concentration of a small number of well-established suppliers that usually possess a proprietary technology and/or have a strong bargaining power. This scenario puts the buyer in a dependent situation, and to change supplier is both difficult and involves a high switching cost (Bensaou, 1999; Svensson, 2004).

3) Problem-solving supplier (high collaboration/high technology) – suppliers with products based on advanced technology that employ collaborative methods to solve innovation problems in products and processes for their buyers. The relationship between buyer and supplier is characterized by mutual dependency, which is built on major relationship specific investment of the supplier and the buyer's demand for the black box product delivered by the supplier. Thus, both parties face a switching cost if they want to break up the relationship and change to another business partner (Kaufman, Wood & Theyel, 2000). Similarities of the problem-solving-supplier can

be drawn to Svensson's (2004) Family Supplier and Bensaou's (1999) Strategic Partnership Profile, i.e. a relationship that involves highly customized products that require advanced technological and engineering capabilities of the supplier. The components may be integrated subsystems of complex nature that can affect multiple stages in the value chain. The upstream market is characterized by intense competition and a great uncertainty regarding technology due to the frequent changes in innovation. The buyer-supplier relationship is characterized by long-term strategic partnership, where often both parties have made important investment into the relationship, which creates a "locked-in" situation to each other. The suppliers are often relatively large firms with a broad product portfolio, and have developed design and production skills tailored to their buyers' needs. In order to handle the intense competition and fast technology development, the suppliers invest heavily in R&D to develop new innovation, which sometimes is done jointly with their buyer (Bensaou, 1999; Svensson, 2004).

4) Technology specialist (low collaboration/ high technology) – suppliers that invest heavily to develop proprietary product based on advanced technology with the best quality and performance on the market. Usually these are independent suppliers that develop weak relationship to their buyers. These suppliers attract a wide customer base through their innovative products rather than to rely on a few buyers. Thus, the parties generally have relatively low degree of dependence on each other, with limited risk for hold up and uncertainty. However, in case the buyer sources strategically important products from the supplier, it can generate locked-in-situations for the buyer, with an increased dependency and a high switching cost as a result (Kaufman, Wood & Theyel, 2000). This is in line with Bensaou's (1999) Captive-Supplier Profile and Svensson's (2004) Business Supplier, i.e. a relationship that involves highly complex products characterized by new technology that is usually developed and owned by the supplier. The components can be integrated subsystems for which the supplier often must make heavy capital investment in order to maintain its position as a superior supplier with strong design, engineering and manufacturing capabilities. Often the products and their technology are characterized by high demand. However, despite this, the buyers may shift supplier quickly once a new technology becomes available on the market. Thus, despite the supplier's proprietary technology its bargaining power is limited as other qualified suppliers are willing to

make specialized investments requested by the buyer in order to obtain a share of the business. Hence the upstream market can be highly competitive and make the suppliers dependent on the buyers that often use multiple suppliers to procure the same high-value component. For example, the buyer can keep three or four firms as their primary suppliers, where each supplier have been given a promise of repeated business through a base contract that will continue unless something adverse occurs. In this way the buyer provides the suppliers with incentives for a more long-term perspective and investment into innovation and technology specialized to the buyer. Thus, the buyer can keep the suppliers highly competitive as it moves the annual volume among the suppliers depending on their quality, cost, or delivery reliability (Bensaou, 1999; Svensson, 2004).

2.9 The posture of supplier relationships

According to Gadde and Snehota (2000) the management of supply side is the top priority in most companies, which can be solved through interaction with suppliers and the solutions adopted are continuously changing in supply strategy due to existed ambiguity and uncertainty. However, it has been suggested that partnering is the superior solution in order to make the most of the supplier relationship. However, Gadde and Snehota (2000) argue that this recommendation oversimplifies the complexities involved in terms of range of products/services supplied and people involved, and is not appropriate in practice.

Hence, *“no general “best” type of relationship exist”* (Gadde & Snehota, 2000 p. 306). In a similar vein, according to Bensaou (1999) there is no type of relationship that can be considered as superior or have better performance to the other. What determines the degree of performance in a relationship is dependent upon successful supply-chain management, which implies a match of the optimal type of relationship to the firm’s different products, market, and supplier conditions. Moreover, firm must adopt the most suitable management approach to fit each type of relationship for optimal performance. Thus, *“Supply-chain management failure is the result of a mismatched relational design or a poorly managed appropriate design”* (Bensaou, 1999 p. 37). Hence, what is most important is the firms’ capacity to cope with a variety of relationships in various ways. Based on these arguments, when firms

approach shifts from purchasing strategy to making the most of supplier relationships, a deeper analytical framework is needed in order to handle the complexities as well as existing potential in supplier relationships. This is essential for firms since the competitive advantage no longer depend on the firm's innate capabilities, but firms' external network, where firms increasingly, outsource non-critical activities, establish close "partnership" relationships with suppliers and aim to reduce and trim their supplier base (Gadde & Snehota, 2000).

Companies acquire different postures of supplier relationship, which coexist within one and the same company, which means different ways of handling and dealing with individual suppliers. In some relationships there are close interaction and interpersonal distance. In others the suppliers have arm's length distance to their buyer firm. Moreover, the buyer firm may pursue joint development projects with some suppliers while others are typical subcontractors who rely on customer specifications. Thus, it is important to consider the actual behavior a firm undertakes to suppliers since it will be the main source of future competitive advantage (Gadde & Snehota, 2000).

Furthermore, companies utilize their relationships with suppliers differently, which is dependent on their core competences, their strategic goals, the nature of the business, the level of technology involved, and the specific context in which they operate. Moreover, a company's supplier network involves various supplier relationships characterized by continuous modifications - over time the company will adjust the scope of relationships and change its configuration of various supplier relationships in accordance to company's demand (Gadde & Snehota, 2000).

2.9.1 Involvement demands resources

Gadde & Snehota (2000) propose "involvement" as a relevant concept in order to elaborate the extent of integration in each relationship. Hence, high involvement is costly due to coordination, adaption and interaction that contains high level of costs. In contrast, low-involvement relationship contains limited coordination, adaption, and interaction costs, since the context is stable and the content of relationship can be standardized. Most importantly, both low- and high-involvement relationships are

needed and firms need to avoid “one-size-fits-all” (Gadde & Snehota, 2000 p. 311) strategy for procurement and supplier segmentation. This is because of firms’ limited resources, and also due to best utilization of supplier potential benefits, where the resources must be allocated to relationship in line with the expected potential outcome. Furthermore, in order to understand the degree to which involvement is the most optimal alternative, we have to consider relationship specific features in the actual context of the buying firms.

As mentioned, a company’s network of suppliers and their capabilities can differ substantially, and thus also differ in terms of the value they can bring to its customer. Some suppliers may only be able to provide benefits in terms of more efficient cost structures, whereas others can be an important source of new ideas and practices (Araujo, Dubois & Gadde, 1999). The degree of contributions and benefits a buyer can derive from a supplier is dependent upon “how” close the nature of the relationships is, such as the degree of involvement. However, the higher level of involvement between buyer and supplier in terms of coordination and interaction, the more resource demanding the relationship will be. Consequently, the benefits gained from a closer relationship with a supplier must offset the investments required to initiate and maintain the relationship (Araujo, Dubois & Gadde, 1999). Hence, on one hand strategic long-term partnership generates new value for competitive advantage, on the other hand it is costly to develop, nurture and maintain (Bensaou, 1999).

2.10 Buyer-Supplier Relationship Models

According to Dyer, Cho & Chu (1998) it exists two widely differing models of how to optimally manage buyer-supplier relationships, which has emerged from both practice and academic research. The first is the arm’s length model or bidding model, where the buyer tries to avoid commitment to the relationship and minimize its dependence on the suppliers to maximize its bargaining power. The second model is a partner model of buyer-supplier management, which in contrast to the arm’s length model builds on close relationships. In the partner model the parties share more information and have increased coordination of interdependent task. Moreover the parties invest in dedicated or relation-specific assets and rely more on trust to govern the relationship

(Dyer, Cho & Chu, 1998). The Arm's length and partnership are considered as the two traditional way of sourcing and still utilized in firms supply strategy source (Gadde & Snehota, 2000). The two models differ between each other on a number of central aspects such as contract length, continuity of the relationship, the level of shared information and relation-specific investments, as well as the trust existing between the parties (Dyer, Cho & Chu, 1998). However, "*largest suppliers are not always the best partner*" (Gadde & Snehota, 2000 p. 311) for major volume of business. In order to be competitive companies must consider new ways of thinking, where the degree of involvement and interaction in the relationships can create additional types of sourcing and associated relationships (Gadde & Snehota, 2000).

2.10.1 Arms' Length Relationship

According to Dyer and Singh (1998) an arm's length market relationship is characterized by four different elements; 1) No relational specific asset investments, 2) Limited information sharing (price is the driving force behind all relevant information exchange between the parties), 3) The parties have separated technological and functional systems, low level of interdependence, and jointly creation of new products and 4) low transaction costs and limited investment in governance mechanisms. Thus, the buyer firm avoids dependency and keeps prices down instead of reaping the benefits through close relationships. The arm's length supplier relationship – i.e. low-involvement approach - is most appropriate for small business volumes- i.e. in terms of monetary basis (Araujo, Dubois & Gadde, 1999; Gadde & Snehota, 2000).

Arms' length relationship is associated with low-involvement and is usually implemented in cases with minor volume of business with suppliers. In this case, the continuity of relationship has short-term nature, in which many firms can lower their switching cost and easily switch from one supplier to another supplier that can offer similar products or services (Dyer & Singh, 1998; Gadde & Snehota, 2000).

Many firms tend to acquire multiple sourcing in order to avoid dependency where they may end up in locked-in situations. Hence, they can avoid the risk of shortage in their supply or input gained from suppliers. Additionally, by creating competition between several suppliers, the buyer firms can shift their order from one to another, which may reduce the direct cost of procurement through a tactical price-based

mentality (Gadde & Snehota, 2000). However, a survey implies that 43 percent of purchasing managers was forced to change back their sourcing strategy from single-to multiple sourcing since it is efficient for them (Porter, 1999). This since there are costs imbedded in multiple sourcing and competition among suppliers such as higher supply handling cost and hidden costs imbedded in relationships, which increase with higher involvement with an individual supplier e.g. investment in term of adoptions among counterparts (Hahn, Kim & Kim, 1986). This also may unable the buyer firm to really reap the benefits of one supplier's economies of scale. (Gadde & Snehota, 2000). Moreover, contract based relationships are not able to create relational rents, this since there is nothing idiosyncratic about the relationship between the parties that allows to create profits that exceeds other buyer-supplier relationships, i.e. it lacks the ability to become rare or hard to imitate (Dyer & Singh, 1998)

Regarding innovation creation, the most adopted supply interface is standardized approach, when the knowledge of use and the knowledge of produce are unrelated - i.e. no directions and no specific connection between user and the producer contexts. In this approach the supplier does not need to understand the user context nor does the customer needs to know about the producer context. Here, customer may benefit from supplier economies of scale and scope. However, adoption to standardized solutions may lead to indirect cost elsewhere. Moreover, there is no direct cost, since there are no customer benefits innovatively, but indirect feedback to suppliers based on sales figures is used (Araujo, Dubois & Gadde, 1999). This approach is similar to Hanfield & Lawson's statement where there is no supplier involvement. In other words, supplier makes to print (Hanfield & Lawson, 2007).

2.10.2 Strategic Partnership

Strategic partnership has increasingly replaced arm's length relationship. This is because firms put emphasis on reducing their supplier base by making partnership as a foundation of their supplier strategy (Gadde & Snehota, 2000). However, partnership is a resource intensive process (Araujo, Dubois & Gadde, 1999; Gadde & Snehota, 2000), and can be managed only with a limited number of suppliers. In this type of relationship, the extent of integration between buyer firm and supplier, in term of relationship specific investment undertaken by either partner affects the performance of the relationship.

However, partnership is associated with high-involvement and significant business volumes (Gadde & Snehota, 2000). Regarding the continuity of relationship, several scholars have also demonstrated that the high-involvement relationship has often a long-term nature (Gadde & Mattson 1987; Snehota & Hakansson, 1995) through which parties create strong resource ties, link activities and actor bonds. This is a time demanding process but once it executed it will signify a high valuable investment making the further continuity of the relationship an optimal option for the buying firm. High involvement is usually associated with single sourcing which is normally a precondition for further integration between buyer firms and suppliers and can also lead to lower supply handling cost (Gadde & Snehota, 2000).

Regarding innovation creation, the most suitable supply interface is the interactive approach, which is based on open-ended dialogue on how the buyer and supplier can co-develop their knowledge of user and producer contexts and develop specification together. This will create direct and indirect cost for both parties. This process can be called as joint learning, through which two resource holders involve in an interaction process for development of their skills and knowledge and utilizing each other's resources. Hence, joint learning is a mutual specialization and involves adoption. In this case, customer may gain benefits through supplier learning about the user context, which will open up the gamut of solutions (Araujo, Dubois & Gadde, 1999). This is also in line with Hanfield & Lawson's (2007) "Grey box supplier" where the buyer and the supplier collaborate closely and jointly decide for design, combine their technological competences and resources, and share high responsibility to develop complex innovation. Thus, the key elements of co-innovation are engagement, experience and co-creation that will generate value in terms of relational rents that is hard to imitate by competitors (Dyer & Singh, 1998; Clauß, 2012; Lee, Olson, & Trimi, 2012).

2.10.3 Durable Arms' Length Relationship

Durable arms' length relationship is associated with low involvement for major volume of business. This is the case when the potential benefits are limited for further procurement of the relationship. This is mostly related to standardized products and solutions, where the supplier has a shortage in motivation for high-involvement

relationship and the imbalance of interest between parties is common (Gadde & Snehota, 2000). In this case, the continuity of relationship has a long-term nature, which indicates that long-lasting relationship can be successfully handled with limited involvement. Bensaou (1999) also mentions this type of relationship through which the buying firms can use short-term contracts with suppliers and still maintain their long-term relationships with intermittent periods of no business together. Hence, this option can also be classified as “durable arms’ length relationship characterizes by less assistance, less face-to-face communication and frequent price benchmarking, and thus lower supply handling cost (Dyer, Cho & Chu, 1998; Gadde & Snehota, 2000). On the contrary, as mentioned, the traditional view of arm’s length relationship is no longer an economically sensible approach, mainly due to high administrative costs caused by managing large number of suppliers (Dyer, Cho & Chu, 1998). The traditional approach will even create more imbalances in power in the relationship. This option may be preferred when the direct procurement costs - i.e. what is shown on the invoice of the supplier which is easy to identify and measure – account for most of the total cost (Gadde & Snehota, 2000).

In case of durable arm’s length relationship, the buying firm may rely on single supplier but at the same time avoid high involvement in order to lower the switching cost in case of changing the order to another supplier in the future. Araujo, Dubois and Gadde (1999) claims that the specified interface is adopted in situations where the buyer firm needs a customized product. Hence, in this interface, resources of buyer and supplier to some extent are adopted to each other and thus supplier’s resource base is locked-in which also limit the possibilities to influence specifications. Furthermore, the supplier receives certain directions i.e. might be prescriptions from the customer on how to produce. Supplier can pool together similar orders in order to attain economies of scale and scope. However, the innovation attained from supplier is minimal even though supplier may suggest changes to blueprint. This is in line with Handfield & Lawson’s (2007) “white box supplier” where there is informal supplier integration since buyer consults supplier regarding design and specification (Handfield & Lawson, 2007).

However, regarding the innovation creation, in both arm’s length and durable arm’s length relationships the buyer can formulate the problem and impose detailed

requirement, or specifications about how the job should be fulfilled. Nevertheless, “*overly detailed specifications kill innovation*” (Gadde & Snehota, 2000 p. 312) and therefore savings through reducing the involvement in large volume of business through durable arm’s length relationships can be significant for the buyer firm (Gadde & Snehota, 2000).

2.10.4 Business Partnership

Business partnership is the most appropriate relationship for supplier with great innovation potential or with particular skills and capabilities that are critical for the buying firm through which firms can undertake boost involvement in the relationship with minor volume of business. For example, large pharmaceutical firms undertake high involvement relationships with small innovative companies in biotechnology. Regarding the continuity of relationship, joint project development has a short-term nature and is a common and viable alternative when it comes to procurement of equipment and investment goods. Buying firm may adopt another common and desirable way by highly involving two or more suppliers of the same product or service since its customer prescribes which supplier to use (Gadde & Snehota, 2000).

In this type of relationship both interactive approach and translation approach can be adopted as suitable supplier interfaces for joint project development. Thus, the parties can either have an open-ended dialogue on how they can develop and co-create innovation, or translate the functional requirements by the customer into a product (Araujo, Dubois & Gadde, 1999). Hence, the innovation according to Handfield & Lawson (2007) can be either a “Grey box supplier” in terms of close and jointly co-creation between the parties, or “black box suppliers” where the supplier is provided with customer requirements in terms of functional specification and have the full responsibility to develop innovation that match customer’s requirements. In the latter, the supplier is given highest level of responsibility for design and development for product and innovation solutions (Handfield & Lawson 2007).

3. Conceptual Framework

In order to fully understand how buyers involve their suppliers in an open innovation context in order to achieve competitive advantage we have developed our analytical framework. This is based on our literature review and the key dimensions of our study. By combining the nature of innovation and the nature of relationship, we have put them into a single context and developed a conceptual model. The two dimensional conceptual model creates four different quadrants, all containing a unique type of relationship. Moreover each quadrant shows the relationships associated degree of control, risk exposure, transaction cost, and potential reward with regards to supplier innovation.

Moreover, the model also indicates a balance between exploration and exploitation on concerning the need to have a balance between involving both new untried and existing well-established suppliers for open innovation, as well as the balance between radical innovation and incremental innovation. Finally, the model also indicates that there should be a mix of the four different quadrants illustrated through exploration and exploitation on both the x-axis and y-axis. Our model (Figure 1) will serve as a conceptual framework throughout the research and provide guiding and comprehension of all the important elements and their interconnection incorporated in governance models to involve suppliers in an open innovation context.

THE TWO DIMENSIONAL MODEL

Y dimension (New vs. well-established supplier)

The Y-axis covers two available options, which is based on the resource-based theory, inter-organizational theory and transaction cost logic. In this respect, the buyer might choose to collaborate with well-established suppliers by which they already have co-specialized assets. In contrast, the buyer might choose to collaborate with new, untried suppliers, for solving simple or complex innovation problem.

Regarding well-known or well-established suppliers, the parties have a common way to communicate and exchange lots of knowledge, thus the supplier has a good understanding about its buyer's business. In similar vein, the buyer also knows about the suppliers' track record. In addition, the parties have complementary resources, and are integrated (locked-in) through already existing relational specific investments,

which implies a switching cost in case of an ending relationship. Nevertheless, the locked-in situation with well-known supplier may lower the chance to achieve radical innovation due to redundant knowledge. In a situation where there is an exchange of hostages, both sides are interdependent which lower the risk for opportunistic behavior. In contrast, it is less stable if only one party is in a dependent situation, which leads to a hold-up risk and higher bargaining power that can be used for own benefits.

In case of new, untried ones, suppliers have made no relation specific investments, which makes them less dependent on the buying firm. The buyer doesn't know about new suppliers' track record including technical competences and absorptive capacity. Therefore, the downturn risk is that supplier might not deliver the requested output by the buyer. However, new suppliers can be a strong contributor to radical innovation project by bringing completely new insights. Even though collaboration with the new, un-tried supplier may also lead to higher dissemination risks as well as transaction costs.

There is a general risk that suppliers hold back some information for themselves since they only invest in what is necessary or for self-interest. Moreover, there is high risk to invite new un-tried suppliers since they may hold back their own knowledge, but try to absorb knowledge from the buyer used for own interest. It is also a risk that great ideas developed in the relationship not protected by clear contracts may be shared with existing competitors in the market. Thus, it is difficult because parties will not reveal anything due to lack of trust, which leads to increased transaction cost as a result of e.g. increased communication, drafting new type of contracts etc.

Hence, collaborating with new supplier always involve risk in terms of revealing necessary know-how to another party. For example, if the buyer firm may headhunt a supplier, which is a strategic supplier to a competitor in the supplier network, it exist high dissemination risk. Despite all costs involved, the reason for choosing untried suppliers is that the current base of established supplier may not come up with radical new ideas due to redundant knowledge. Thus, even though the buyer neither knows exactly about the outcome nor the invited un-tried supplier, collaboration with a new supplier with reliable track record can lead to radical innovation. Moreover, managers may improve their bargaining situation and create new alternatives by inviting new

suppliers which make the buyer less dependent on their existing suppliers. This will enable the buyer to create competition in the upstream part of the value chain.

X dimension (Simple vs. Complex Innovation)

The X-axis of our model demonstrates two options, which are based on organizational learning theory as well as innovation theory. This implies that when the innovation problem is complex (radical innovation), the knowledge needed for solving the problem is tacit. Therefore the manufacturer needs to collaborate closely and simply interact with suppliers for problem formulation and co-creation. Moreover, we argue that achieving radical innovation is a complex problem and requires knowledge exchange to high degree. This is the case, if the buyer firm really aims to explore long-term goals, which has uncertain nature in terms of the innovation outcome. Regarding complex innovation problem, the context and the end-propose is not clear which means that the manufacturer doesn't know how to actually formulate the problem. The buyer has more holistic view of the context without knowing the specific outcome and commercial ends. For example, the buyer firm has a wide idea but can't come up with some specific solutions. Therefore, the problem is unspecified and the buyer firm needs to involve suppliers for problem formulation and innovation co-creation.

In contrast, the simple innovation problem (incremental innovation) is of explicit information that can be codified and pre-specified. Hence, the manufacturer can formulate the problem, e.g. the design manual and functional specifications internally. Considerably, we argue that achieving incremental innovation problem has more a simple nature and the relationship is based on the more one-way communication with the suppliers. This is the case when the buyer needs to improve the products through short-term exploitation. In other words, this is more a safe way of innovation generation where the buyer has more control of the innovation process as well as the outcome, and does not have to reveal information to the same extent.

Complex innovation and new versus well-established suppliers

In this particular option, the buyer firm can either select new, un-tried suppliers to increase the variety of new ideas and achieve radical innovation, which is associated with higher risk exposure, or just rely on well-established suppliers. Regarding the

long-term strategic partnership with well-known supplier the risk involved is lower/or moderate due to relationship specific investments –i.e. lock-in situation. This since, it is less likely that the well-established supplier will use the knowledge they attain for their own purpose. On the other hand, if the buyer selects a new supplier and initiates a new business partnership, there is a risk that the supplier keeps the know-how or technology of the innovation secret, which increases the buyers' dependency. The supplier has not so much to lose since the buyer has not invested so much in the relationship. Hence, the supplier might be tempted to cheat its business partner by going to another buyer.

Simple innovation and new versus well-established suppliers

Regarding simple innovation problem, the problem is pre-specified and the buyer has the option to invite both new available suppliers and well-known suppliers- for an open bidding round in order to exploit short-term goals. In this particular way, there is a price competition between suppliers and the buyer-supplier relationship has an arm-length or durable arm's length nature. Thus, the buyer firm has high bargaining power over its suppliers, and can demand product improvements in order to constantly solve pre-specified innovation projects. Also, suppliers have to take the risk for investing into incremental innovation projects; otherwise the buyer firm can downgrade or even eliminate the supplier from its supplier base. Moreover, whether the manufacturer selects the established or well-known suppliers, the selected problem solver or supplier doesn't need a lot of feedback since everything should be clear up-front i.e. according to the buyers' requirements. For example, in principle, the bidding round is predominantly about price competition, thus the information for the design manual – i.e. the problem- should be accessible for all invited suppliers in the beginning of the solution search process. However, in contrast to well-known suppliers, collaboration with new suppliers always involve a larger transaction cost and moderate risk, as a result of contract drafting and unknown performance of the supplier.

The main outcome of the conceptual framework

As it shows in our conceptual model below, the analytical framework has two dimensions (scales): the incremental versus radical innovation dimension and the well - established versus new supplier dimension. If we take the perspective of the manufacturer, the combination <radical innovation + new supplier> associates with

maximum downside risk exposure, whereas <incremental innovation + established supplier> is the relatively safe combination. Additionally, the former option is associated with high risk, and low degree of control. In contrast, the latter option is associated with low risk, and high degree of control. In this respect, the former combination also is the “executing” one inasmuch as it requires relatively high contract drafting and coordination/communication costs. In general, the former combination may give an extremely high payoff in terms of a profitable, radical innovation, but is at the same time thwarted by high transaction costs and high transaction risks. In other words, the manufacturer (in case, a wind turbine producer) tends to be confronted by a dilemma or tradeoff between, on the one hand, a potentially high reward (in terms of a successful radical innovation) and, on the other hand, low transaction costs and risks.

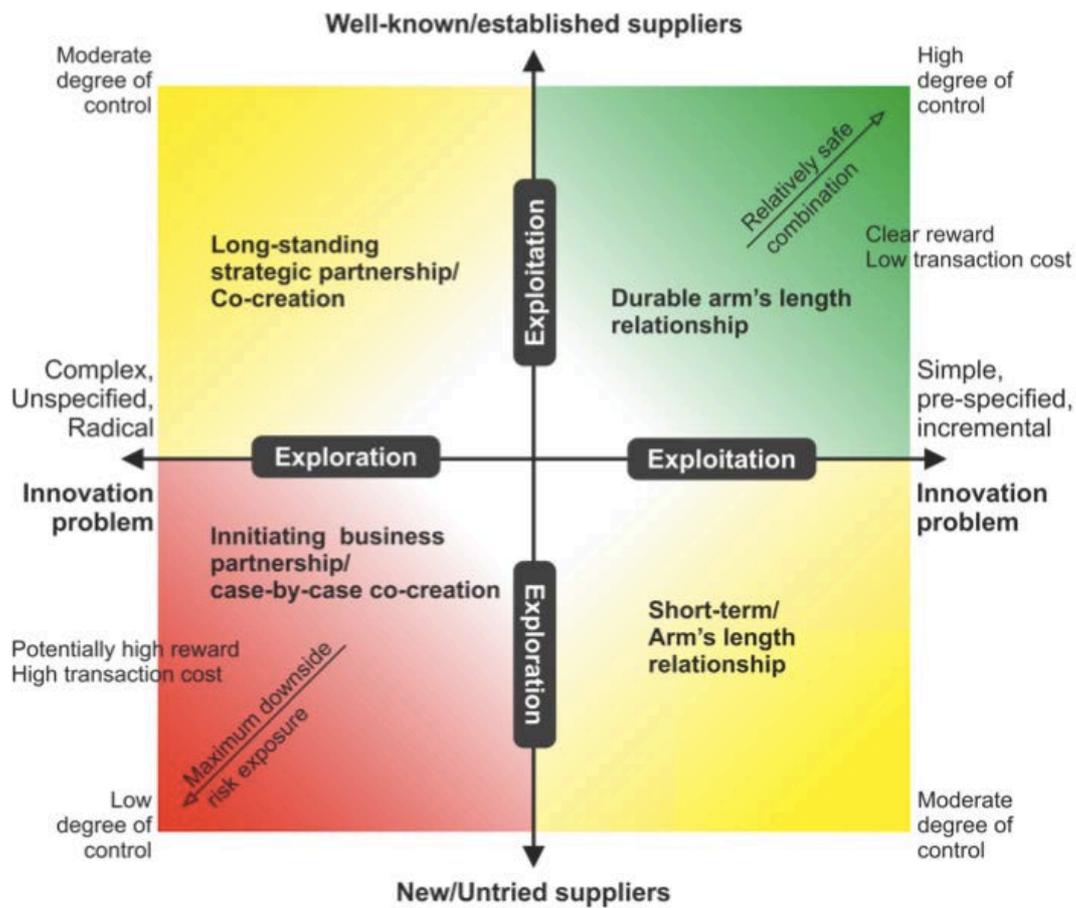


Figure 1: Conceptual Model of Supplier Innovation

4. Methodology

This chapter contains an overview of the research methods used in the research process. Specifically, it explains in detail the chosen research approach, the gathering of empirical data, and analytical procedure, which were utilized in order to assure credibility and high validity throughout the research.

4.1 Research approach

The initiation of our research process started when we realized the importance of suppliers' innovation for their buyer's success and competitive advantage. Moreover it became evident that buyers utilize different types of relationships with different suppliers and that the posture of relationships were correlated with different types of innovation. Thus, in order get a thorough understanding about the concept of open innovation with suppliers and different types of buyer-supplier relationships, we conducted an extensive literature review. During this process it became evident that no single theory explained all the important elements related to risks and benefits associated with the concept of open innovation with suppliers. Hence, we created a theoretical framework, which consists of theories related to open innovation, supplier innovation, supplier segmentation and selection, and buyer-supplier relationships. By drawing on this framework, we developed a conceptual model that could serve as a foundation to theoretically explore open innovation with suppliers and thus outline how buyers involve suppliers in their innovation through different types of relationships in order to obtain competitive advantage. After the collection and presentation of the empirical findings we conducted an analysis, which enabled a confrontation of our conceptual framework and model. As the initial model showed some differences compared to the empirics and thereby could not be fully applied, we developed a revised conceptual model based on the dissimilarities found. Our research process previously described is an abductive approach discussed by Ghauri (2004).

4.2 Research Design

This study focuses on the Wind-turbine industry as the research setting and the buyer-supplier relationship and supplier innovation as the unit of analysis. Innovation has for decades been a core component for firms that aim to differentiate themselves from competitors and boost the business growth to gain an increased market share (Henke Jr & Zhang, 2010). However, the concept of open innovation and particularly supplier

innovation is a more new phenomenon that has gained momentum during the past decade (c.f. Chesbrough, 2003a, 2003b; von Hippel & von Krogh, 2003; von Hippel, 2005; Chesbrough, Vanhaverbeke & West, 2006; Laursen & Salter, 2006; Felin & Zenger, 2014). Although there exists previous research about buyer-supplier relationships and supplier innovation, there is still a limited understanding of this complex area, which makes it suitable for a qualitative research. Therefore, qualitative research is suitable when there is a lack of theory or the existing theory not adequately explains a phenomenon (Merriam, 1998 p. 7). Moreover, we have also chosen a case study design of our research, as case studies are considered to be appropriate for qualitative research, which focuses on a real-life context or phenomenon that addresses questions such as “how” or “why” (Piekkari & Welch, 2004; Yin, 2009). Hence, this is also in line with the “how” nature of our research question.

4.3 Research Unit and Sample

In order to find relevant companies for interviews we used lists that presented actors in the industry, which we found at Danish Wind Industry Association, Danish Export Association homepages, and through search on Google by different search words. From these lists we identified roughly 40 suppliers with focus on innovation that operated in different parts of the value chain, which we approached with request for interviews. Thus, our intention was to capture a unique sample of suppliers (Merriam, 1998 p. 62), based on their unique and different attributes in order to get data to insert in our conceptual model. In total we succeeded to get interviews with one manufacturer and four different suppliers. These companies and their features offered the variation of characteristics that were interesting for our study (Merriam, 1998 p. 62). As a result we could find important patterns from the companies due to their diversity and heterogeneity that could help us throughout the analysis part of our research (Patton, 1990 p. 172; Merriam, 1998 p. 63).

4.4 Case Companies

Our topic includes specific information about both innovation and relationship features that our respondents (the buyer and supplier firms) considered as rather sensitive. Hence, we offered our respondents anonymity which further enhanced our findings. This since the respondents could talk more open and reveal more information that they would not have done otherwise.

Buyer X is a multinational corporation that operates in 73 countries and is one of the leading wind turbine manufacturers on a global scale. The company is always in the forefront when it comes to products with new solutions, cutting edge technology and the latest innovation. Through its many years in the industry the company has strong reputation and its turnover represent a substantial part of the total production volume or installed MWh annually.

Supplier A is a Danish medium sized company that serves customers primarily within the wind turbine and offshore industry. In addition it supplies products to customers within industries where the products are characterized by a very high quality level and operating in extreme environmental conditions. The company has been operating for more than 20 years in the wind industry, where it supplies advanced products related to the turbine blades and electronics.

Supplier B has its headquarter in Denmark with production facilities located around the world with a superior goal to be close to its customer around the world. Its 35 years of experience supplying hydraulic cylinders to wind power components, setting new standard of excellence, from massive scale to critical detail. Moreover, the company provides customized solutions for ensuring the optimum performance of customers' products or equipment.

Supplier C has an international reputation for excellence with a history built on innovative technology and superior products that meet the ever-changing needs of customers for more than 60 years. The Company is a leading provider for innovative solutions to servo motion control problems worldwide such as shaft couplings, adjustable speed drives and keyless lock bushings, and one of the wind industry's most trusted coupling manufacturers. In addition, they also work towards other industries with demand for similar products.

Supplier D has for over 40 years been a major producer of electronic products and sensors for measurement of temperature, humidity and gases and also various products for controlling of the climate in greenhouses in the horticultural business. There are two divisions of product areas, Sensors and Green Business, each division has its own sales and R&D departments.

4.5 Data collection method

The empirical data for this study has been gathered through different sources. The main part of the data comes from the findings of our field study including various actors operating in the wind-power industry. We collected the data through formal semi-structured interviews with key employees and through observations. The interviews have been conducted both through face-to-face meetings and by utilizing Skype for electronic meetings. The respondents were different types of managers and other relevant persons that possessed relevant knowledge about our topic from one of the leading manufacturers, i.e. a buying firm and four different suppliers from the wind turbine industry (See Appendix 1 for list of interviews). To further strengthen our findings from the interview we also have used data from official documents such as industry reports and internal company documents.

4.6 Interview Process

For qualitative research, interviews are generally the most common method to collect empirical data (Merriam, 1998 p. 71; Bryman & Bell, 2011 p. 63). Interviews offer access to a special kind of information that cannot be observed, such as behavior or feelings of individuals or how people interpret things in the world around them (Merriam, 1998 p. 72). Hence, the researcher wants to understand what is “*someone else’s mind*” (Patton, 1990 p. 278). In general there are two main types of qualitative interviews – unstructured interviews and semi-structured interviews (Bryman & Bell, 2011 p. 63). For our study a semi-structured method were the most suitable as it enabled us to focus on the topic but at the same time keep the interview open for our respondents. This resulted in more open answers and consequently offered more valuable information. As a basis, we used an interview guide where the majority of the questions had an open-ended approach (See Appendix 2 & 3). In order to ensure that the interview questions could bring value to the research and answer our initial questions, they were controlled and approved by our supervisor.

Due to the level of complexity of our subject and confidentiality issues regarding both innovation and relationship characteristics, we only conducted interviews with professionals at higher management level. Moreover this also provided information of reliable quality from persons with a good knowledge about the subject and a holistic view about the company and the industry. We interviewed more than one person in the responding companies in order to get reflections from diversified professional positions. However, it should be mentioned that there is always a certain degree of limitations of the information retrieved, which is related to issues of confidentiality and how much information the respondents wants to reveal.

During all the interviews recording equipment were used, which ensured that everything discussed could be preserved for analysis (Merriam, 1998 p. 87). Moreover both authors were present at all interview occasions which minimized the risk of missing important information, but also enhanced the interpretation as well as the analysis of the collected data. Since the interviewees were from different countries, all interviews were conducted in English in order to ensure that both parties could fully understand each other. In addition to the questions related to our topic we also asked our respondents information about their position in the company, number of years in the company and in the industry, which was valuable in order to contextualize their answers (Bryman & Bell, 2011 p. 475).

For our better understanding, we also used probes during the interviews (i.e. question asked in response to the respondents' answers), which required the respondents to elaborate on their initial answers or statements. (Collis & Hussey, 2009 pp. 145-147). In addition to the interview question we also presented our conceptual model during our interview with the buyer. This is in line with the arguments of Bryman & Bell (2011) "*an interview guide not necessarily have to comprise written words: instead it can take the form of a series of visual prompts related to a subject*" (Bryman & Bell, 2011 p. 473).

This provided a discussion and elaboration of the model and its application in a real-life context. Moreover some real examples were briefly presented and discussed how these examples could fit into the model. This further enhanced our understanding of

different types of innovation and buyer-supplier relationship in an open innovation context.

4.7 Analytic Procedures

According to Merriam (1998) it is important during the collection of empirical data to simultaneously analyze and reflect the gathered information at an ongoing basis. This is a way to avoid unfocused data that can result in complications later on in the research process. Hence, right after the interviews we went through our notes and transcriptions which were followed by discussion. This helped us to summarize all important information and reflections and secured that no crucial data were lost.

All the empirical data were later structured with the help of our theoretical framework and conceptual model, which facilitated the subsequent analysis. By comparing the data it was possible to identify differences and similarities with regards to our conceptual model. This process enabled us to re-conceptualize our initial conceptual framework and draw important conclusions in order to answer and elaborate on our initial research questions.

5. Empirical Background

In this chapter we present an empirical background to the wind turbine industry, more specifically it presents the recent changes in the industry, which have generated

a more intense competition for all involved actors. This trend have increased the importance of innovation in order to offer differentiated products at the lowest cost, best quality, and have the most efficient energy production. As the manufacturers (buyers) have limited resources and have specialized in their own core competencies to stay competitive they rely more and more on their suppliers and their competences and know-how for the majority of components in the turbine. However, despite the increased outsourcing to suppliers and their importance, the buyer-supplier relationship has occurred to be strained in many relationships due to the industry climate. The intention with this chapter is to provide the reader an understanding of the industry and its challenges to better understand the empirical findings.

5.1 The case study of the wind turbine industry

The wind turbine industry is an absolute example, where manufacturers acquire additional requirements from suppliers based on what end-users want. Hence, the maturing process of the industry shifts manufacturers' expectations from best solutions to enough quality which further puts pressure on supplier for additional investment in process as well as product customization.

Since the 2000s, the global wind industry has had a continuing expansive growth despite the global economic crises and excessive fluctuations. Thus, the number of installed wind power capacity has an accelerating year-on-year growth. This implies that, wind power has not only succeeded to maintain, it has also strengthened its position as the most technologically advanced and reliable source of energy compared to other alternative sources of energy. Only in 2010, about 24,000 turbines – corresponding to 39, 400 MW - were installed in 50 different countries worldwide. This fast growing development has paved the way for the movement of production and development hub away from Denmark and Europe towards Asia, which now represents the largest market potential and highest production capacity in the world (Andersen & Drejer, 2012).

Thereby, we find the wind turbine industry remarkable to investigate, since it is one of the key drivers behind the green energy. Additionally, the field of the industry is high-tech and therefore involves high degree of innovation. However, the global wind turbine industry is in the process of maturing, paving the way for new challenges due to ongoing transformation of the supply chain. As a result of globalization, manufacturers in this field of industry aim to achieve economies of scale as well as product quality at a lower cost (Andersen & Drejer, 2012).

Consequently, in line with the maturing process, the collaboration and competition parameters have changed as well. Hence, new requirements and priorities have been added, whereas manufacturers/buyers shift their overall aim from “best solution” to “good enough”, for example the manufacturers have changed their contracting strategy by which they offer short-term contracts to suppliers. Indeed, there is a gap between suppliers’ priorities and manufacturers’ expectations. This further puts the pressure on suppliers since they must invest heavily on new equipment and labor with necessary knowledge to change their processes and products based on the manufacturers' requirements (Andersen & Drejer, 2012).

Consequently, these expectations become even more challenging for managers, since a turbine consists of 8, 000 different components. Key parts of the wind turbines in terms of cost are for example towers, blades, gearboxes and power converters, and many suppliers as well as service providers use follow-sourcing strategies in order to be in close proximity to wind turbine manufacturers. Most of the time, the components are customized for each individual manufacturer, for each project, and turbines are built and customized to a particular wind farm. Suppliers often design components such as gearboxes, generators and power electronic based on the specifications given by the wind turbine manufacturer (Lema et al., 2011).

Moreover, due to complexity of modern wind turbines - i.e. larger wind turbines - as well as high durability of these products, it is required that both manufacturer and supplier collaborate closely for exchanging vast number of information, specifying the design, testing the prototype of components and finally achieving the most optimal result. This creates a relational value chain where manufacturers collaborate closely across the value chain with a relatively small number of world-class key suppliers on a regular basis in the continuing race for developing bigger turbines with better energy efficiency. This also creates more long lasting relationships and considerable switching costs since suppliers have accumulated knowledge about the manufacturers' products and processes (Lema et al, 2011).

Based on the interviews among suppliers, manufacturers and power companies conducted by Danish Wind Industry Association (DWIA) in 2012, the structure of production and development organization is changing. As mentioned, the industry’s evolution and maturation process is a key driver behind new parameters for

competition versus collaboration. Additionally, the coordination of supply task has become too complex to manage entirely through informal relations between suppliers and manufactures/buyers (Andersen & Drejer, 2012).

Furthermore, the actual transformation process can be difficult since many suppliers have accumulated extensive experience and a long-lasting track record for development of components as their core skills. Suppliers and manufacturers have a contradictory view regarding how to address the changing market practices such as transforming the business model. Thus, in some cases, these factors lead to resistance in change and reluctance for undertaking new risks and learning new skills outside their comfort zone (Andersen & Drejer, 2012).

5.2 The main challenge

The Danish wind industry association (2012) addresses that excellent subcontractors rely on excellent customer relationships, as an important challenge. This is important, since suppliers are major cooperation partners for manufactures and are the backbone of the wind production. Suppliers' flexibility and traditional problem solving skills and more importantly, suppliers' know-how – e.g. toughest mechanical solutions – have played and continues to play a key role in relation to technological advances. In fact, these valuable abilities have been created by long-standing experience and are valuable for manufacturers who demand process optimization and consistent innovation.

6. Empirical Findings

This part of our study outlines the empirical findings of our research. We use our conceptual framework and literature review to articulate categories that explain the ways to involve supplier in an open innovation context. We will introduce our

respondents as anonymous since it was important for them. First, we present Buyer X (manufacturer), followed by supplier (A), (B), (C) and (D) separately in order to highlight the nature each supplier.

6.1 The Buying Firm (X)

6.1.1 Innovation

Due to a maturing industry with an intensified competition it has become much more important for Buyer X to differentiate itself from competitors in terms of costs, quality and products to gain market shares. Moreover there are also increasing customer demand and other challenges such as emerging markets, seasonal demands, local content, and shorter time to market that must be tackled. During recent years the complexity of the turbines has increased dramatically. Thus, in sum, all companies in the industry are striving to offer turbines to the lowest price, with the best quality and the latest technology that can generate the best energy production capacity – efficiency (megawatt). This is obtained through continuous innovation in the entire value-chain, which is the key to growth and competitive advantage. (Buyer X Interview, 2014).

“In simple words you can say that innovation is about top line growth - growth on the sales side, but also on the bottom line- in terms of reduced cost...Thus, Innovation for us can be anything that adds to that bottom line in any stage in the value-chain”. (VP of Global Sourcing, Buyer X).

Thus Buyer X works with innovation on a daily basis in terms of both incremental and radical innovation. The incremental innovation is of more simple nature and focuses first and foremost on cost reduction and quality improvements aimed to extend the lifetime of the products and lower maintenance cost. Hence, targeting lower cost is a crucial element of the incremental improvements to increase profitability and is also required by both shareholders as well as customers (Buyer X Interview, 2014).

The radical innovation is of more complex nature and is mainly aimed to develop new technical solutions for existing or new turbines models that enable bigger turbine and/or can generate more energy. It can also include for example to come up with radical breakthroughs for the production process or to develop critical solutions for

new materials that dramatically improves the cost structure, durability, or abrasion resistance of the products.

“25 years ago we had a turbine with 27 meters across, which at that time was cutting edge - the biggest turbine you could see, it could simply not be physically bigger due to the engineering of it and it produced 225 kW. Today our turbine is 164 meters across - bigger than the London Eye and it actually produce 35 times more energy than the turbine 25 years ago. For us this is radical innovation such as from analog to digital or from DVD to Blu-Ray in the electronic industry” (VP of Global Sourcing, Buyer X).

Although some manufactures have decided to niche into production of few sizes of turbines, while others offer a wider product portfolio, the competition is high within all segments. However, the turbine manufactures not only compete against other companies in the industry but also against other sources of energy. Hence, it is not only important to offer the customers a reliable source of energy with a low level of failure but also to offer low cost per megawatt (\$/MWh) that is competitive compared to alternative energy sources. This scenario makes innovation to a core component that helps the wind turbine manufacturers to constantly improve their products and compete against other industries (IRENA, 2012; Buyer X Interview, 2014)

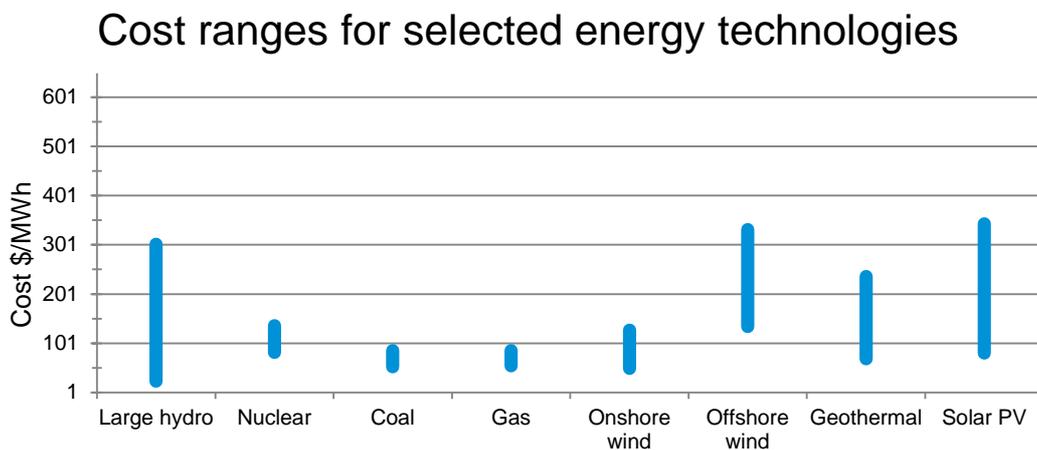


Figure 2: Cost of Energy, Source: Internal Company Document, Buyer X

6.1.2 Supplier Innovation

“We probably get more innovation by opening up our network to our supplier base. Because they tend to know the products (their products) better than we do, and also they have the possibility to transfer learning’s from other industries and maybe apply them into our industry - and that is something we don’t have” (VP of Global Sourcing, Buyer X).

Buyer X still has a substantial internal R&D, but its suppliers are crucial for the company’s innovation and are growing in importance. However, the growing significance of supplier innovation is a fact that has matured rather recently. It is during the recent years that suppliers’ contribution in terms of competences and know-how for innovation has gained its momentum.

“The suppliers are very important for our innovation, but we still have a lot of our own internal R&D. Maybe because the industry is relatively immature - compared to e.g. the automotive industry” (VP of Global Sourcing, Buyer X).

This is related to substantial changes in the industry, subsequently changing the industry conditions. During the years 2007- 2011 there was a year on year growth of approximately 20 percent in the industry, but between 2012-2013 it has been a decreasing market followed by a maturing trends. However, forecast shows roughly two percent yearly growth up to 2020. Thus, the industry changes has transformed the way of thinking from traditional purchasing or procurement into global sourcing. This means a supplier network that not only delivers products to the lowest possible price, but also utilizes their competences to innovate and create solutions that can meet the new challenges. By relying more on the suppliers’ competences the company can focus on their core competences and thereby improve its efficiency (Buyer X Interview, 2014).

“In 2007, when we were working in sourcing - all manufacturers just tried to secure their materials. Thus, your discussion with your supplier was not about innovation - it was actually can we get the materials in the door, can we process the materials, and how quickly can we get the materials and get the orders out to the customers”. (VP of Global Sourcing, Buyer X).

The increased usage of the supplier network can be reflected by the innovation developed during the five-year period between 2008-2012 compared to the two-year period between 2013-2014. During the first period characterized by more internal innovation accompanied by some supplier innovation, the company developed one new platform, six new product variants, two new rotors, new generator and converter technology, and a new gearbox design. During the latter period with an increased suppliers' innovation and 30 percent less employees, the company developed one new platform, six new product variants, four new rotors, and new technology for blades, generators, controls, and high tower (Buyer X Interview, 2014).

“Thus this signals that we work with suppliers more or work better as team - I think it is about using the supplier network - and we are tending to that more and more. Look at our competitors they are doing the same” (VP of Global Sourcing, Buyer X).

The supplier innovation is of dispersed nature and of different complexity in order to cover improvements for all stages in the value-chain. Hence, it ranges from more simple innovation such as improved logistics, standardization, re-design or substitute materials that contribute to cost reduction, improved quality performance, and better control of production, maintenance and spare parts. But it can also be very complex innovation that involves developing completely new technology, parts or solutions needed to produce bigger turbines with better and more reliable energy production capacity. Radical innovation can be also to find new solutions that not directly are a precondition for a new turbine model, but instead can work as a complement product that substantially increases the sales figure by opening up new customer segments. This increased sales opportunities can come from solutions such as deicing systems for the Northern parts which increase the performance of the turbines or radar systems that open new areas for wind park close to airports (Buyer X Interview, 2014).

6.1.3 Managing Supplier Relationships and Innovation

Buyer X has vast supplier network including companies characterized by dispersed competences, economic size, commitment etc. that complements its own core competence and enables the production of various types of turbines. It is a complex task to manage the entire supplier network and find the right type of relationship with every supplier that is both efficient and can generate innovation. In order to obtain a strong performance on both bottom line cost and top line growth, Buyer X works with a collaborative supplier program that implies different types of sourcing on innovation. For incremental innovation aimed to improve the cost structure and enhance quality, the firm works with rapid and strategic sourcing, associated with innovation in terms of cost structure, quality improvements, reduction of complexity, standardization etc. For radical innovation Company X pursues value sourcing that is aimed to boost innovation opportunities through the development of completely new products or solutions that can differentiate the products and increase sales (Buyer X Interview, 2014).

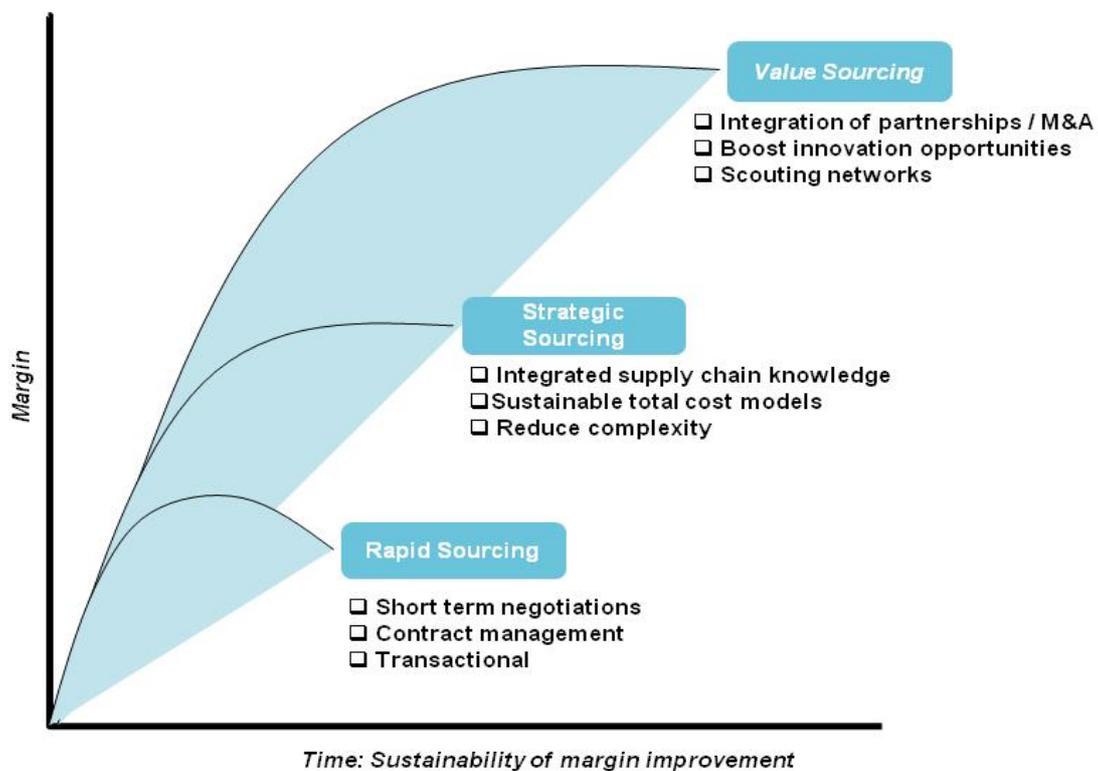


Figure 3: Improve Innovation and Profitability through driving Top and Bottom Line Growth, Source: Internal Company Document, Buyer X

The aim of working with different type of sourcing is to achieve innovation throughout the whole value-chain. Therefore all suppliers irrespective of which category they belong to, constitute an important link in the chain to achieve successful innovation. As stressed by the VP of Global Sourcing “*Innovation is highly relevant for all types of supplier relationships*”. The supplier innovation associated with the various sourcing types requires different levels of time and investment but also offer different margins of value (Buyer X Interview, 2014).

6.1.4 Supplier Relationship Models

As previously mentioned different supplier types are linked to the various sourcing types and their associated innovation. In order to manage the vast number of suppliers with different features, Buyer X utilizes different types of relationship types/models towards its suppliers and uses a segmentation model to categorize them into different supplier types. Two criteria in terms of 1) commodity/purchase importance (monetary spending) and 2) Supply risk/ complexity of the product are used to create four different supplier types and their associated postures of relationships (Buyer X Interview, 2014).

The segmentation strategy is something that has been adopted during recent years in order to better control and optimize the supplier network and to get the most out of every relationship in terms of innovation and other benefits. This has been a necessary tool to obtain a high degree of differentiated products, lower cost and better quality needed to fight for customers related to the changed growth in the industry.

“Regarding the segmentation, I think it is becoming more normal, but has not been normal in the past - the reason to this is connected to the growth in the industry... Of course you could argue, if we had the segmentation 5-10 years ago it would be so much simpler - but a company like us during this time was also recruiting thousands of people, building a lots of factories around the world, and the maturity was not in the company and in the industry at that time “(VP of Global Sourcing, Buyer X).

Consequently, the evolutionary perspective in the industry has forced companies to think about supplier segmentation, account management structure and category management in order to adapt to the changing industry. Even though the wind-turbine industry compared to e.g. the automotive industry is some years behind, there is a movement towards a similar supplier management strategy. Thus, the wind industry

more and more reflects matured industries characterized by big players, intense competition, continuous optimization and innovation (Buyer X Interview, 2014).

Supplier Segmentation Model

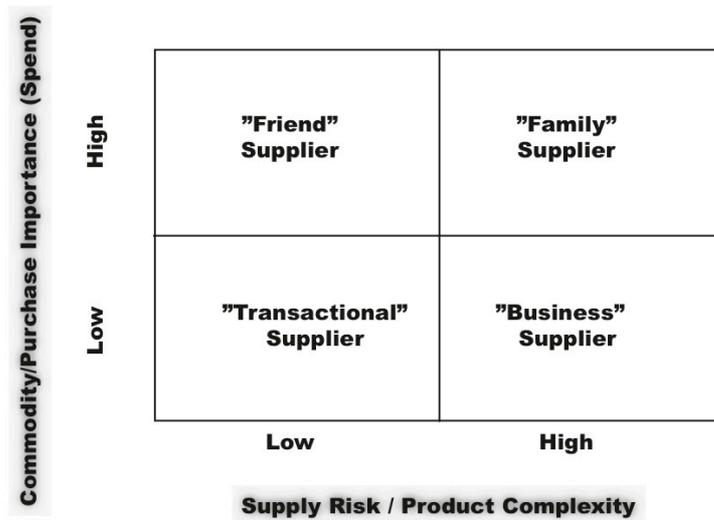


Figure 4: Supplier Segmentation Model, Source: Buyer X

Friend

This category of suppliers supplies products that score high on commodity importance and often involve high volumes, but involves products of less complex nature. The suppliers are considered as crucial for the business and can have the potential to become strategic suppliers in the future depending on their technological competence. Even though the relationship not necessarily implies long-term commitment in terms of contracts, there is a long-term thinking involved. The products and their technological level do not belong to the most complex parts in the turbine but these products are still considered as advanced and are of customized nature. Thus, the relationship involves idiosyncratic investments, which are usually made by the supplier. With regards to innovation, it is primarily about incremental improvements of more simple nature aimed to enhance quality and lower cost.

Family

This category is the buyer's strategic suppliers that is crucial for the company's operations and supply components that is of high importance for the final turbine. Moreover this type of supplier produces advanced products with a high technological level that involve a high supply risk. Due to the complex nature of the product the supplier possesses important know-how and strong problem solving skills. Thus, the innovation is of complex nature and can hardly be specified or printed on a specification. In these cases the innovation problems are jointly solved through co-located teams. Moreover, the supplier requires a good understanding of the manufacturers' products and has a holistic perspective of the value chain, as well as a common way of thinking and communication. The relationship is based on partnership with a long-term intention, and often involves a high level of relationship specific investments, which can be made by the supplier or shared by both parties. Due to the importance of the supplier, the senior management team participates actively in order to plan for future innovation creation.

Business

This type of suppliers is considered as less important compared to the strategic supplier due to the lower purchasing volume or monetary spending. However, the suppliers are still very important to Buyer X business as their products are of a complex nature and thereby involve a high supply risk. The products have a high technological level and are of customized nature. The suppliers can be large leading firms within the field of products and technology, but can also be small entrepreneurial suppliers that have front edge competence within specialized areas. Often the supplier works across industries and serves other buyers in the industry as well, rather than depending on an exclusive relationship. Consequently, the relationship is not based on a long-term commitment, but rather on a high involvement during a specific period of time (case-by-case basis) for example during a project. However, the relationship can also last for longer time depending on the specific component, but in contrast to e.g. the relationship towards strategic suppliers it is not based on mutual investment and joint future plans. This since the supplier has its own agenda and often invest heavily in its own innovation to develop proprietary parts or black-box parts containing advanced technology that they rather prefer to

supply to the entire market than just a few exclusive buyers. Due to the high technological level of the products the innovation is often about complex innovation aimed to develop radical solutions. The innovation problems are most often jointly solved as a result of the specific know-how of the supplier that needs to be combined with the knowledge regarding other parts of the turbine possessed by the buyer.

Transactional

This type of suppliers provide standardized products that are usually not customized or come with minor changes. As the supplied component does not involve a substantial commodity importance or supply risk, the relationship is based on a pure market or transactional basis. Thus, the supplier interface is managed through contract management with short-term negotiations and contracts, where price and quality are important elements. Usually the upstream market consists of multiple competent suppliers for the same component, which offers the opportunity to easily change supplier. Due to the low level of technological complexity and customization there is rarely any relationship specific investment involved in this supplier type. The innovation characteristic is of simple and incremental nature and initially targets an improved cost structure.

6.1.5 Configure supplier innovation – Cross-functional teams

In order to handle the vast supplier network and all the different parts of the turbine, the global sourcing department within Buyer X consist of seven different global category teams. They are divided into: Electrical, Powertrain, Composites & Coatings, Mechanicals & Weldments, Tower, Castings & Raw Materials, Indirect components, and Market sourcing. Each category is responsible for all supplier types within its category, which involves to manage all types of sourcing and work out suitable relationships and way to utilize supplier innovation in order to obtain efficiency throughout the entire value-chain (Buyer X Interview, 2014).

“The category management team is essential when it comes to innovation, because you put so many competences and skills under the same roof and trying to solve different problems and then also take in external help to do that - an innovation network, which could be small suppliers, existing suppliers, new suppliers - that is when the magic happens” (Global Sourcing Specialist, Buyer X).

Innovation Network

Who?

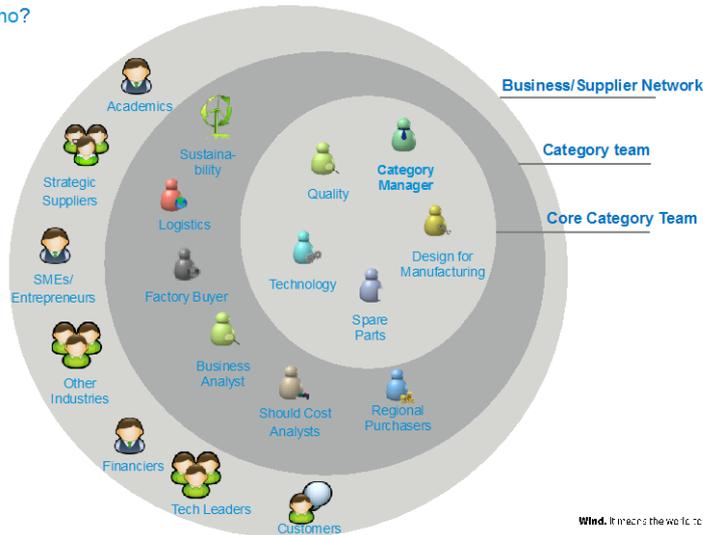


Figure 5: Cross-Functional Teams, Source: Internal Company Document, Buyer X

Thus, when buyer X has an innovation problem, the task is usually put on the company's R&D department, which together with cross functional teams and the suppliers tackle the innovation problem based on the conditions at hand. By combining dispersed competences within the firm it is possible to gain a holistic view of the problem and thereby make better decisions, but also to manage the supplier interface more efficiently. Depending on the innovation's degree of complexity, the company can chose to formulate the problem internally and develop specifications communicated to supplier for solution, which is usually the case for more simple innovation. For more complex innovation that is hard to formulate and requires expertise from suppliers in terms of know-how, the company usually calls in the supplier for joint problem formulation and co-creation of the innovation solution (Buyer X Interview, 2014).

Thus, when Company X has an innovation problem its solution search strategy starts on a broad basis by evaluating the supplier short list, and screening the market in order to find new potential suppliers to bring in. All suppliers are analyzed and evaluated on cost, capacity, logistics, quality, and technology. The company then choses a selected number of suppliers and requires request for information (RFI), which narrows the number down to only a few supplier and request for quotation and samples. The final step is to integrate the supplier, or ideally two suppliers for dual sourcing, benchmarking, and competitive issues.

However, problem formulation and solution search strategy might also be of reversed nature, since suppliers also contact Buyer X and suggest new innovation ideas not considered within the company (Buyer X Interview, 2014).

“There is a clear process of how we develop our new products - a very clear stage gate model, but how the ideas would be triggered for supplier innovation coming in to this are different. It can also be that suppliers can simply call us up and say - we have a great new innovation and we think that you should think about it for the next turbine model - so the timing for it happens it’s more informal” (VP of Global Sourcing, Buyer X).

6.1.6 Competition VS. Cooperation

In order to keep competition at the right end within all supplier segments Buyer X at regular intervals benchmarks its supplier on their product to ensure that they are competitive. This implies an individual evaluation on various parameters such as quality, price, CTQ performance, R&D competences, and innovation. In addition to the selected suppliers on a component, Buyer X also preferably uses so-called “outside challengers”. This means that the company brings in new suppliers that do not get a huge volume but are very keen to bring new innovation to the table. These suppliers can win volume based on their innovation, which creates competition within the segment and ensures that all suppliers constantly keep their work on innovation at a high level (Buyer X Interview, 2014).

“It is about keeping the competition on the right end- or at the right level - if you work with suppliers for a long time, of course you get to know them well- but there is always a risk for a kind of complacency breaks in, or the competitive side is not that strong - so it is always good to have what you can call outside challengers - you typically like to see 2-3 challengers on the outside that is not getting a huge volume but they might be very hungry and very keen to bring you innovation so you can keep the big guys in check and also you make sure you get the best kind of dynamics in the market” (VP of Global Sourcing, Buyer X).

The supplier network is constantly changing, where the company initiates and ends relationships, or changes the set up or posture of existing relationships. This means that suppliers can change position in the segmentation model and acquire a different supplier status. Also, suppliers may go into temporary relationship on a case-by-case basis for specific innovation and development projects.

Nevertheless, irrespective of the type of supplier and relationship, it is important to manage the supplier interface in a good and trustworthy manner.

“How much do you get if you invest in the relationship in a good and open way from your supplier diverges. If you take out the baseball bat and treat them mean you don’t get as much as if you treat them in a nice, open and cooperative manner”. (VP of Global Sourcing, Buyer X).

This creates proactive suppliers that more actively push for innovation and are willing to invest in technology for innovation generation and share information without a purchasing order. Even though it is important to try to balance the interest of both parties it is a challenging task. As stressed by VP of Global Sourcing *“the suppliers are in different types of markets and there are different types of relationships. We also kind of choose what industry we are in, and the dynamics is changing over time. You could always find situations where you could say that suppliers would claim or would really feel to be mistreated”.*

Nevertheless, Buyer X aims to work with suppliers in the long-term due to high switching cost, while they require high performance. Thus, buyer X avoids short-term thinking when they do business with suppliers. *“We don’t remove business just in the short-term - that is a hustle for everyone”* (VP of Global Sourcing, Buyer X). However, the company does not stick to its current supplier just because they are well known, in case Buyer X really believes in other suppliers' potential that can bring benefits. In this way the company can create competition within its supplier network. As also mentioned by the VP of Global Sourcing *“we turn to our current suppliers and say this is the conditions that you all bid under - this is actually what we see that your competitors are doing. I think in the long run what we are doing is actually helping them - but they might not feel that on that day- especially if you give the contract to another supplier”.*

Buyer X believes that even though the competition can be seen as negative by the supplier, as long as the intention is to help suppliers, the company itself and the business, it will definitely work in the best interest of both parties. As mentioned by the VP *“first is always better to help them - it is equivalent to an employee that lacking in something - what do you do - do you just let it go -or should you have a discussion where we talk about the performance - maybe there is something behind it. So, You need to address the issues. “*

To stay competitive requires to continuously generate innovation. Consequently, even though Buyer X has the intention to work on a long-term basis with its suppliers, it is hard to predict the industry's trends a head. Hence, yearly contracts are not always feasible.

“I mean you could work with the same supplier for 25 years, but if you would commit on a single product for 1 year or 2 year or more - that could be risky - I mean what happens if a new innovation comes up in the next 12 months - maybe we committed on some kind of product that is no longer efficient. But I think it depends on what kind you commit on right, you should not commit on specific volumes on specific items for such a long period - it could maybe be overtaken by some other innovation” (VP of Global Sourcing, Buyer X).

6.1.7 Supplier satisfaction & preferred customer status

An important element in Buyer X's strategy for successful supplier innovation is to be customer choice of the industry. This is obtained by treating suppliers in a good manner, which is crucial to obtain a preferred buyer status in the industry. In terms of innovation this can offer Buyer X priority access to new supplier innovation and sometimes exclusivity to the invention for a period of time, which enables the company to get ahead of its competitors.

“We want the suppliers to come to us first – that is why we are striving to treat them in good way - it should be good to come here first with their latest innovation. So we are trying to be the customer choice of the industry - we want all the leading innovations to be offered here first” (VP of Global Sourcing, Buyer X).

It is also important to have an open dialogue with the suppliers as well as an open mindset that shows that new ideas and innovation are welcome in the organization. As pointed out by VP of Global Sourcing: *“I think that suppliers tend to like work when they are more motivated - so much rather they will come here and we have a good dialogue and we have a good discussion about create innovation - instead of going to one of our competitors and maybe don't get that dialogue”*.

To acquire a position as preferred customer, in addition to working for good relationships towards its suppliers, Buyer X offers different types of incentives to increase its suppliers' satisfaction. The main parts of these incentives are related to large volumes and increased supplier reputation that can boost future business opportunities. As a leading manufacturer in the industry Buyer X has a large customer base and can thereby offer its suppliers large production volumes that provide economic incentives, and a reduced risk for idiosyncratic investments related to innovation. Moreover, the product portfolio including the biggest high quality turbines on the market makes Buyer X attractive as a brand for suppliers in the industry in terms of reputation. If the supplier can put Buyer X on its customer list this becomes a kind of prove mark of meeting high quality requirements that can help the supplier to gain future business.

“Quantities are one part that is very important but it is also about brand recognition. We are a market leader that stands for quality - a brand you would like to be associated with as a supplier. This can boost the business for the supplier - if you could work with Buyer X and meet their quality requirements - other companies often say - then you can work with us as well. So it becomes a reputation for future business“ (Global Sourcing Specialist, Buyer X).

Moreover, Buyer X sometimes also offers incentives by reducing its suppliers' risk for innovation projects by shared investments. This is decided depending on the specific case and is related to the relevance of the innovation, the specific supplier, relationship status, and the contractual conditions.

“If there is an innovation coming up - we also may have to discuss investments - and that could be shared, it could be with the supplier, or it could be with us - it depends on the situation.... we understand their financial status. So if going to work on a long-term development, we also have to agree upon how we work together and make this financially viable for both parties”. (VP of Global Sourcing, Buyer X).

Market/ Industry characteristics

Moreover, the market or industry characteristics have a substantial impact on how to manage the supplier network, which is simply related to demand and supply, as well as the bargaining power among suppliers and buyers. During the time period characterized by strong growth, i.e. 2007-2011 there was almost a shortage of competent suppliers for the buyers on the market. However, as the market has become saturated” *it has been a kind of over capacity for many areas in the industry*”. The end customers are pushing for a lot of innovation and a lot of cost reductions since they got so many options. Thus, *“it has flipped over to become more of a buyers market”, where supplier must constantly innovate to satisfy its buyers needs of differentiated products*“ (Buyer X Interview, 2014).

“The dynamics in the industry and market forces for innovation - and calls for the term innovate or die. So if you don’t innovate in this markets you end up bankrupt. Thus, you can say that suppliers must constantly innovate in order to be attractive for the buyers” (VP of Global Sourcing, Buyer X).

6.1.8 Supplier involvement – Risk exposure & safeguard measures

In line with the changing industry and increased supplier innovation Buyer X has changed the way to involve the suppliers into the innovation process. In the past, the traditional way of innovation was more of a closed innovation approach. This implies that the company basically developed everything and the specification itself, finished everything internally, and then the supplier made it in accordance to the specifications. Today the innovation is of a more output-based nature that is based on functional specification. In contrast to clear-cut specifications, the supplier is instead asked to develop an innovation that should fulfill various types of requirements. This means that the supplier get the freedom to design and develop the best possible product or solution at the lowest cost in accordance to given requirements (Buyer X Interview, 2014).

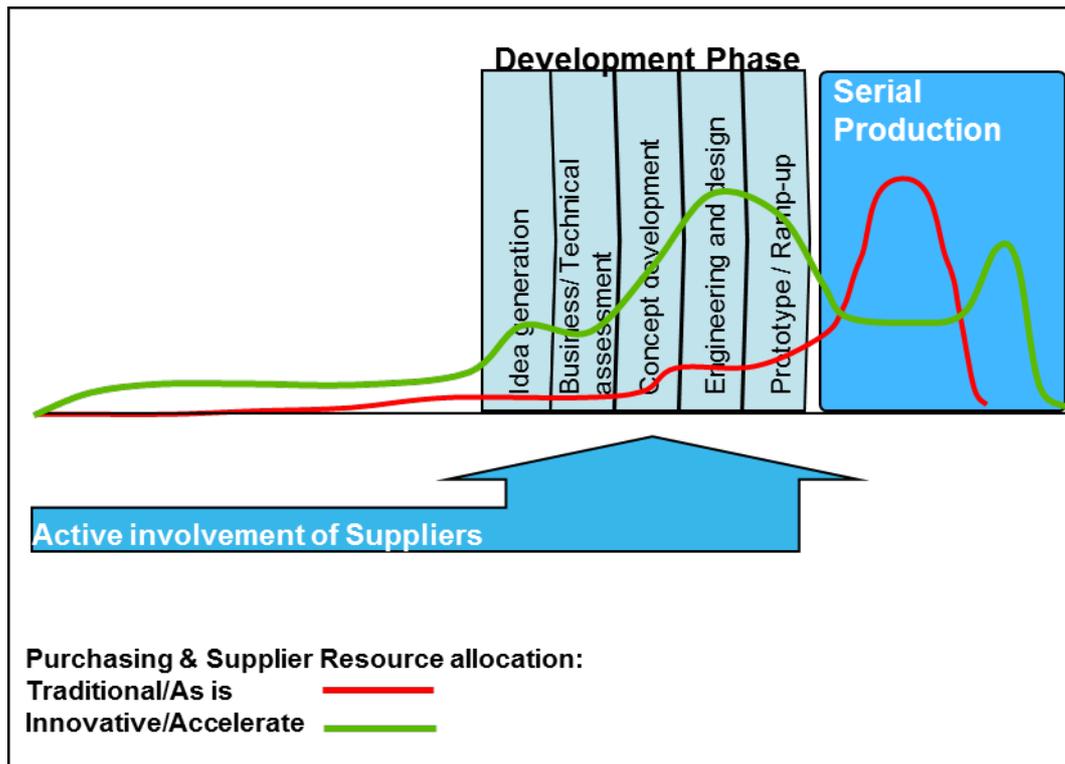


Figure 6: Supplier Innovation Development Process, Source: Internal Company Document, Buyer X

The functional specifications provide substantial savings as the company does not have to put time and resources into development of specifications. This disengage of resources allows the company to focus on their own specialization and core competences required to tackle the increased competition. Moreover, Buyer X has also the experience of both lower cost and better innovation associated with a more open approach. This since the supplier get a better overview and can better plan the development, but also get forced to find solutions that match both technical and cost requirements (Buyer X Interview, 2014).

However, at the same time as the increased outsourcing and supplier involvement offer huge advantages it also exposes the company to risks. In line with increased specialization the company's competences within some areas get diminished, whereas the suppliers acquire increased knowledge. The risk is to put the company in a dependent situation as the supplier has the full control regarding the component and its related technology (Buyer X Interview, 2014).

“I think the only downside of going by the green line and sign up for that - is so you make sure you don’t get backed or stuck into a corner. You have to be aware of that of course the supplier’s’ ambition is to make you so dependent on them that you can not go elsewhere - and we always need to keep that kind of freedom to do that” (VP of Global Sourcing, Buyer X).

The associated risk is of different nature depending what part of the turbine that is concerned and is related to e.g. the supply risk, technological complexity, level of customization, number of suppliers on the upstream market, and internal R&D competences regarding the specific component. To handle the risk exposure related to increased specialization Buyer X utilizes different types of safeguard measures. One part is related to standardization and modularization of components in the turbine. There is an ongoing work aimed to move towards more modularization or plug and play both within Buyer X and in the industry as a whole. This enables the opportunity to shift to another supplier through a plug and play concept, where the “start and end” connections are the same. Thus, basically it is possible to just change from e.g. one gearbox supplier to another that fulfills the same technical and quality requirements without major complications at a controllable switching cost (Buyer X Interview, 2014).

“It depends what part of the turbine it is about, we need to be clear about what is our core competences - technically and what is that of the supplier. Technically it can be okay to have a black box or a module - maybe the connections at the start and the end are the same of the part, and then we can get a similar black box from 5 other suppliers. But what that individual supplier does essential of this black box - is a black box” (VP of Global Sourcing, Buyer X).

The second part is related to the internal R&D and competences of the firm, where the company tries to maintain a certain level of technological know-how for crucial part of the turbines. This enables the opportunity to internalize the innovation process and thereby generate specifications that can be put on another supplier for production. To keep a certain degree of internal R&D and know-how is also an important ingredient in order to perform more complex innovation together with suppliers. To possess a high level of technological competences both facilitates the co-creation process and lowers the degree of dependence as the company also has knowledge about the technology in the component.

As stressed by the VP of Global Sourcing: *“We also have our own R&D because we know our own industry well as a leader in the industry - so we need a combination of both our own R&D and supplier innovation”.*

6.1.9 New Vs. Well-Established Supplier

In order to be competitive and constantly improve its products and develop new solutions Buyer X always looks for new suppliers that can deliver high-quality and innovative products at the right time and price. This does not imply to constantly shift suppliers as it implies substantial switching costs, but rather a strategy to keep the existing suppliers competitive.

“Our objective is to have the lowest total cost - and our aim is of course to do that with long-term commitment - but we would not just stick to our current suppliers - they have to be competitive as well. But it is also related to the market - our customers want to be provided with best products at the lowest possible prices if they should stick to us” (VP of Global Sourcing, Buyer X).

To work with new suppliers is also essential in order to get access to new and necessary knowledge not possessed within the existing supplier network. Thus, to find suppliers that can offer new radical solutions is often a precondition in order to develop new turbine models with new technology.

“For our newest product worked very closely with a company that normally does solution for aerospace and automotive industry, they were a completely new supplier to us but were actually very integral to us in terms of the new technology in our new product”. (VP of Global Sourcing, Buyer X).

However, apart from the benefits of working with new suppliers it also implies a risk of potential opportunistic behavior. As stressed by the VP of Global sourcing: *“There is always a perceived risk with an unknown supplier - For example, some suppliers we might have worked with them for 12 months and you can feel absolutely not. We find that they hide information, they pass information to competitors they, they are not open with us - don't bring us all the stuff”.*

Moreover, it also takes time and resources to initiate new supplier relationships and make sure that the parties will complement each others' key criteria necessary for innovation development.

The VP of Global sourcing describes the challenges of new supplier relationships as *“difficult - you still have to invest the time to make sure that you have a common way of working right. So you have to check in - do you have the right expectations on behavior - can you put the right agreements in place in terms of this is going to work. It is like a relationship that you have in your personal life - you have to find out do you do have a match right? Do we meet on key criteria?”*

In contrast, there are also open suppliers who prefer trusting relationships, have an open book, which means that they neither hide things nor try negotiating for maximum. These reliable suppliers actually do business in an honest way. Hence, in a very short period of time you can feel that both sides have a very good meeting of behavior. This also stressed by VP of Global sourcing *“I think it can be more difficult early - trust is built over time, but I think it is still possible”*.

For existing or well-established suppliers the company usually has data or a track record on their performance. For new suppliers the company instead has to use references from others (market based trust) or ask for examples or samples in cases of more simple innovation and products. However, when it comes to more complex or radical innovation, it is harder to pre-evaluate the new supplier. It may be possible to use references from other companies to some extent, but it normally requires a visit to the new supplier and its R&D department to discuss about their innovation in terms of what they are working on, how they work, what are their process, and what is their network of suppliers. Moreover, it has to be match of culture, behavior, and way to communicate to make sure that it is possible to work on an innovation project for a longer and sometimes unknown period of time (Buyer X Interview, 2014).

“I think you can feel it in the activity of the supplier, some suppliers might be very strict - they do what we have asked them for, whereas some suppliers are really active - and ask have you thought about this, what about this etc. - so you can feel that kind of attitude and behavior - or the will power - do they want to bring it to the next step - or are they just happy to stay where they are”? (Global Sourcing Specialist, Buyer X).

In order to reduce the possible risk when involving suppliers for innovation as result of eventual opportunistic behavior, Buyer X uses a development agreement that is signed with the supplier.

The agreement states that the parties jointly agree to collaborate on a specific scope of work and the future they see together. This is evaluated as the work is going forward and parties enter into those agreements with the best will from both sides. However, managers also find out as they go through that agreement, they either find that it is going well and keep going, or experience a mismatch and need to split up from the relationship.

”Yes, there is always a perceived risk with an unknown supplier - so again you have to talk it through and also complement that by put in the right agreements in place - for example all suppliers we sign NDA: (non disclosure agreements) before we share anything. And if you talk about significant innovations (radical) then we go into development agreements - i.e. how do we work together? - I think a lot of it is about having the right agreements - but also talk it through together, i.e. what do we mean?” (VP of Global Sourcing, Buyer X).

So in summary it is about having the right agreements, talk it through to understand each other, but also about parties' expectations. In 99 percent of the time suppliers see business in a good way. The companies are not only there for the short-term but for the long-term expectations. Thus, proper practices are not enough, and need to be complemented with integrity and honesty. Moreover, it is acknowledged that structures are a relatively small part of securing an innovation into your organization. Hence, it is much more about having the right behavior and creating the right culture. As stressed by VP of Global sourcing: *“Don’t put in a structure - because innovations normally do not come from a very tight structure - It normally comes from the freedom of act. Thus, you can only get incremental innovation by structure, you will never get a destructive innovation (radical) if people operating in their normal structure. So yes, I think it is possible in a short space of time to achieve radical innovation with a new supplier”*.

The VP also added that disruptive technologies or radical innovation typically don't come from the people that they should come from. All companies invest in their R&D department expect to come up with innovation internally. However, all firms can be too far into their own ideas and areas, without noticing that many great innovation on turbines can come from various sources, where very innovative small firms (suppliers) with 2-5 people that develop very innovative ideas can play a major role (Buyer X Interview, 2014).

6.1.10 Management Profile and Comfort Zone

Buyer X strives to find the right mixes of different supplier relationships that match the company's resources and internal competences, but also one that can offer both incremental and radical innovation (Buyer X Interview, 2014).

“There should be a mix of the models in the segmentation. I don't think you could say there is not any best model of buyer-supplier relationships - I think it is important that for me different models show you different things” (VP of Global Sourcing, Buyer X).

Even though the various models such as segmentation model, supplier selection and evaluation are important tools for the management of buyer-supplier relationships, for Buyer X they only work as a framework. This means that they need to be complemented with the right management profile and right corporate culture in order to be fruitful. As stated by the VP of Global Sourcing: *“ Models are important - but how the models are implemented and the culture in them is very important. So you can have the same model in one corporate culture and it could absolutely be fantastic - and that is dependent on the leadership style and the culture - and the same model could completely die in an organization where it is simply not welcome. Thus, the prerequisite for a model is actually the culture around it”*.

The management is thus essential in order to have the right level of flexibility required for successful innovation. This since *“innovation normally does not come from firms with very strict structures such as models – it should be some elements of that, but the behavior is important - how does the managers work“*. Due to the importance of management, Buyer X strives to have managers that not only are into hard facts, but also possess “soft” skills in terms of the right competences and comfort zones, which can handle relationships with the suppliers effectively (Buyer X Interview, 2014). *“It is about your own leadership style or comfort zone - also what do you hang on as a person as your competency. I think it is important in terms of leadership skills - you look for people who can manage more and more the relationship with the suppliers and are less into all the specifications of hundreds of details”*. (VP of Global Sourcing, Buyer X).

6.2 Supplier Firms (Contextual Profiles)

6.2.1 Supplier A

Brief description

Supplier A is a Danish medium sized company that serves customers primarily within the wind turbine and offshore industry. In addition it supplies products to customers within industries where the products are characterized by a very high quality level and operating in extreme environmental conditions. The company has been operating for more than 20 years in the wind industry where it supplies advanced products related to the turbine blades and electronics.

Product Characteristics

The products are characterized by a very high quality level as well as high technological level and are aimed for end products that operate in extreme environmental conditions.

Innovation Characteristics

Supplier A works extensively with innovation both in terms of continuous improvements in terms of cost and quality, and with new radical solutions for its customers. The innovation work is based both on completely outsourced innovation projects from its customers and joint development projects together with personnel from the partner firm. The incremental innovation is usually completely outsourced by the customer innovation and can be either according to the customers' requirements in terms of functional specifications or more open demands communicated by buyer.

“Sometimes we work out solutions by our own, but often we work together with our customers. Their engineering or R&D people often have valuable insights of the problem and sometimes there are other components involved in which we lack knowledge. It depends on the customer’s competences and project, but I believe it is valuable for both parties as we jointly can find optimal solutions and at the same time learn from each other” (Sourcing Manager, Supplier A).

As a result of the tight partnerships where a majority have been for a long period of time, Supplier A and its customer have developed a common way of communication.

In addition it has developed strong knowledge about its customers' needs and products. This saves both time and money as things does not have to be done several times before they become right. Moreover, the company and its customer have an open agenda regarding the future. Thus, they can start to work on ideas for new solutions or improvements regarding future models in advance. This pre-sourcing is advantageous for the buyer in terms of reduced development time and cost, but also for the supplier as it better can plan and calculate its resources (Supplier A Interview, 2014).

“There are several advantages when you have close and long standing relationship with your customers, you speak the same language and understand each other, this minimize misunderstandings and create benefits for both parties when it comes to innovation” (Sales Manager, Supplier A).

Supplier A has an extensive experience from solving its customers' most complex problems in different industries, which involves fuzzy front-end innovation. This complex innovation often starts with a blank sheet of paper based on an idea or a problem that should end up in a customized solution or product (Supplier A Interview, 2014).

“We gain value from working across different industries as we continuously increase our learning and problem solving experience, which we then can apply to our customers in another industry” (Sourcing Manager, Supplier A).

Relationship Characteristics

Supplier A has a long-term strategic relationship with a selected number of customers, and has partly shared relational specific investment with other suppliers (Supplier A Interview, 2014). As Sourcing manager of Supplier A also stresses; *“In the majority of all our relationships we are a strategic supplier to our customer. However, this does not imply that we relax as our customers usually have additional suppliers that want to get an increased share of the business. Therefore, we constantly need be efficient and improve our operations to keep our place as number one”* (Sourcing Manager, Supplier A).

“I believe most of the relationship to our customers can be seen as equal dependent or balanced... of course we need them for our survival, but they need us as well due to our strong knowledge of the products and their specific business” (Sourcing Manager, Supplier A).

Supplier Characteristics

As a result of its long experience in the industry, supplier A has developed valuable know-how within its segment. In addition it has a substantial experience from other industries involving similar advanced products. Often the knowledge developed during an innovation project in one industry can be utilized and applied to solve a problem with another customer within another industry. (Supplier A Interview, 2014).

Market Characteristics

The upstream market in which Supplier A operates is characterized by an intense competition among a limited number of companies compared to the markets for more simple components. This since the high technological products require specific know-how and the business is capital intensive.

“Of course we face an intensive competition as all other companies in the industry. But to develop and produce products in this segment requires both a high level of capital and knowledge. This makes our competition somewhat different compared to more simple products in the industry since you not replace a supplier of our products as easy as one that deliver e.g. screws.” (Sourcing Manager, Supplier A).

6.2.2 Supplier B

Brief Description

The company’s engineering team provides solutions to help customers to solve product issues, develop new products, or producing based on specifications and thus aiding customers to achieve their goals. The company stresses the importance of open communication, by keeping the communication lines open between their expert engineering team and customers’ team. Follow-through and follow-up strategy on every detail, from project initiation to delivery and beyond, thanks to extensive experience within designing, product innovation, prototype development, starting a development process from the beginning, etc. The company’s ability for handling any challenge on the front end, prevents costly problems later in the projects. Moreover, the company has its own research and development center divided into two departments: project engineers who run customer projects in corporation with sales department, and development engineers who work with strategic projects based on the

firm's overall objectives, all dedicated to come up with innovation solutions in order to satisfy customers (Supplier B Interview, 2014).

Product Characteristics

Supplier B produces and develops high technological/complex products such as Braking Systems, Cooling Systems for generators, converters and gearboxes, Lubrication System and Accumulators. In addition to provide customized solutions and components to the wind turbine industry, the company work towards customers in the offshore as well as marine sector. It has been recognized that supplier B is an independent supplier working with multiple customers. However, even though supplier B is an independent supplier with a broad customer base, it still initiates more innovation co-creation with some selected key customers. (Supplier B Interview, 2014). As the global sales manager mentions; *“Of course our innovativeness increases to our reliable customers”* (GSM, Supplier B).

Innovation Characteristics

The company works extensively with radical innovation to launch new products on the market. They also work constantly to find new and better solutions for improved quality and reduced prices. The company considers its innovation efforts as crucial for its own as well as customers' success (Supplier B Interview, 2014). *“Innovation for us means introducing new products to the market. The innovation outcome for us is about reducing prices, enhance quality and improve energy production efficiency”* (GSM, Supplier B).

It is recognized that Supplier B gets motivated by constantly creating radical as well as incremental innovation in order to be a perfect partner and stay competitive in the market. As the global sales managers stresses, *“The innovation is crucial not only for our customers' economic factors but also for achieving best quality, which improve supplier's B reputation among other competitors - offering best solutions drives us be innovative, our target and business strategy is to be innovative”* (GSM, supplier B). This acknowledgement shows how important the company's inputs –i.e. know-how- are for customers' competitive advantage (Supplier B Interview, 2014).

Relationship Characteristics

It has been realized that the company works extensively on a case-by-case basis with several large buyer firms. This further generates interdependency between supplier B and those specific customers where both parts usually interact in joint development projects to solve complex issues. However, supplier B also has some long-term relationships. Thus, the company offers unique solutions to its customers. Therefore, it is stressed that supplier B can appropriate good value from their relationships with its customers (Supplier B Interview, 2014). *“Even though we often make the relationship specific investments required to generate innovation, we feel that mutual value is created in our inter-organizational relationships”* (GSM, Supplier B).

It is acknowledged that a reliable customer motivates supplier B to make specific investments, target one customer, and increase the efforts (Supplier B Interview, 2014). *“This is usually not a problem for us, as we have well-established cooperation with reliable customers, we need to be innovative to stay competitive in the industry as a preferred supplier- It is part of our DNA, it is part of our strategy”* (GSM, supplier B). In addition, Supplier B has an instinct motivation to always be the best in terms of innovative supplier in the field, which also leads to supplier’s competitive advantage. Moreover, according to the global sales manager, the motivation to be innovative increases if the customer has the best solution or product on the market, which will further give the supplier B a high status as well (Supplier B Interview, 2014). *“Customers can trust us because we never compromise on quality”* (GSM, Supplier B).

It has been realized that the company works with innovation both based on the customer needs to develop solutions and in cooperation with the buyers' engineers for innovation co-creation (Supplier B Interview, 2014). *“In cases when we develop or innovate based on the customer needs or requirements, the directives are most often very open or output based – but co-creation is about interaction and joint problem solving“* (GSM, Supplier B). The orders are usually based on description/specifications of what customers want. Hence, the supplier B has a very large influence on the final outcome.

Supplier Characteristics

Supplier B offers close collaboration with its premier engineering team with the extensive experience for designing and manufacturing each of customers' products with highest quality. The company's engineering capabilities ensure successful solutions to the wind turbine industry and even for many other industrial applications (Supplier B Interview, 2014). *“Our innovation gives us larger business volumes, and higher margins compared to our competitors in the market”* (GSM, Supplier B).

Market Characteristics

The company designs and produces products for the offshore and marine industry and plays an important role in both markets worldwide. Their knowledge for designing products and finding solutions for the wind turbine industry is incomparable mostly due to extensive experience as a supplier to international wind turbine manufacturers. In general, it is acknowledged that the industry moves from sourcing components to sourcing modules. This is mostly due to value-chain configuration and increased competition (Supplier B Interview, 2014). However, *“these changes don't affect our innovations. Of course, industry's engineering based nature affects where the buyer's innovation is created... in here by 'us' ”* (GSM, Supplier B).

6.2.3 Supplier C

Brief description

The company's engineering team performs fully accomplished solutions, adaptations and repairs to meet customers' requirements, needs and wishes - all with a determined conception of quality, optimum solutions as well as performance and service with a strategic distribution points –e.g. world partners and distributors- located throughout the world. It is also stressed that Supplier C strives for collaborating with customers to solve difficult problems and their extensive experience of the industry makes them strong in the area of customer service. In addition, they are known throughout the world for premium products, experienced staff, and clean manufacturing processes. The company creates value for customers by offering experienced practical advice, responsiveness to customers' needs, predictable high quality products with high performance, continues improvements, durability as well as integrity (Supplier C Interview, 2014).

Product Characteristics

Supplier C produces coupling and torque limiters designed for gearboxes and generators, which obtain and transmit all misalignments and torques occurring during complete lifetime of the wind turbine. The products are customized and produced according to the customers' exact needs and the company provides fully accomplished solutions, adaptations and repairs. Supplier C has a determined conception of quality, optimum solutions and service (Supplier C Interview, 2014). *“Although the component is not among the most complex parts in the wind turbine, its technological level still requires a substantial level of engineering expertise and knowledge”* (BOM, Supplier C). Moreover, the directives given from manufacturer to Supplier C are more open for the designing process of the products. The manufacturer provides the supplier a design manual and the supplier has to fulfill their technical requirements. In the beginning of this process the supplier is able to influence the design manual. Hence, the manufacturer is open in the development phase to adjust their requirements (Supplier C Interview, 2014).

Innovation Characteristics

It is stressed that the company *“develops product different than other suppliers”* (BOM, Supplier C). This is because there are several flexible components in their product and each of these components can be developed in various ways (Supplier C Interview, 2014). *“So the way we doing thing and develop our products is our innovation”* (BOM, Supplier C). Additionally, the materials the supplier uses in the products have high quality, which also strengthen the lifetime of the products (Supplier C Interview, 2014). According to the Branch Office Manager *“Our innovation is also about quality which will guaranty the long lifetime of our final product – so we lower the maintenance cost for our customer”* (BOM, Supplier C). Supplier C emphasizes the importance of quality i.e. ISO 9001:2008 certified as well as flexibility in order to meet or exceed expectations, achieve total customer satisfaction and most importantly create innovation (Supplier C Interview, 2014).

According to supplier C the innovation is quality, which leads to better turnover. This becomes more challenging since there is a high level of competition in this field of industry, where the manufacturers employ several suppliers for producing these types

of products (Supplier C Interview, 2014). *“Our product life time/quality have made us a preferred supplier compared to other suppliers since they have some problems with their products... lot of failures... and therefore manufacturers choose us since according to them we could provide better and stable solution for their wind turbines (BOM, Supplier C). As result, the supplier C has raised it shares from 35 percent to 75 percent compared to the last year. However, this positive trend can always change if other suppliers develop and improve their products (Supplier C Interview, 2014).*

It is stressed that if Supplier C gains very low level of margin in their supplier- buyer relationship, they consider if they will continue to collaborate and invest in that particular relationship. In the wind turbine industry a supplier survives with big volumes, and now there are many suppliers on the market. In other words, it is a buyer market where most of the suppliers are scared to gain lower margin and therefore there is always a price competition for higher volumes (Supplier C Interview, 2014). *“In our case, we don’t go after wider product portfolio (don’t go after bigger wind turbines); the margin we gain is too low that don’t even pay our development cost so it is directly affect our innovation. Therefore, we only focus on smaller wind turbines and mostly on incremental innovation where we improve our products quality“(BOM, Supplier C).*

However, the manufacturers can motivate Supplier C by always trying to limit supplier’s risk, which will give the supplier opportunity to avoid having too much in stock (Supplier C Interview, 2014). *“The manufacturer can offer more stable contracts, for instance manufacturer can draft a contract for 500 product units, but if they only achieve 400 this years, they will buy the rest in the next year. Even though this may lead to extent delivery time for our part, it can secure our sales and help us to determine the input we need for our products. This is the way we should do our business... I prefer more long-term relationships” (GSM, Supplier C).*

Certainly, the supplier is already involved in innovation creation activities and has contracts where they in consultation with its customers’ development department try to create new customized components (Supplier C Interview, 2014). Nevertheless, according to the branch office manager *“the buyer will always create value for itself, this is not an equal situation” (BOM, Supplier C).*

Moreover, the global sales manager adds, *“We let the customer to decide how they want to do it... We are willing to sell our products to one customer and provide them exclusivity as long as they draft longer contracts and give higher margin of our sales since manufacturers sell the products for multiple prices, maybe five times higher”* (GSM, Supplier C).

Relationship Characteristics

The sales of wind turbine products generate half of the turnover, where 20 percent of this turnover is generated through service companies and the rest is contributed from the main customers around the world. *“Half of our turnover is contributed through wind turbine industry, which shows that the innovation has given us very good results - we constantly change our products in order to improve our sales”* (BOM, Supplier C). However, as stressed by the global sales manager: *“about 80 percent of this turnover is only from one customer, which also shows how risky this business actually is”*. Since the supplier C is half owned by a Japanese company, the organizational culture is about friendship in the first place and business comes second, in contrast to western culture where business comes first. Therefore, as Supplier C also mentions *“We will keep our good relationships and connections rather than just competing with other suppliers. There are examples in real-life context, where we chose to not go in that specific market, but only supply specific customer because one of our main partners was already in that market... Thanks to our innovation and strong organizational culture -friendship and commitment- it is not uncommon at all to receive a call from an old customer for new orders who has used our products for decades”* (BOM, Supplier C).

Moreover, the Global Sales managers also stresses that; *“We are too many suppliers on the market and we all want a piece of the cake... this is we (suppliers) who have given the buyer firm possibility to let us fight against each other. We all wanted the biggest share of the sale”* (GSM, Supplier C). *“If the competition would be smaller the suppliers could set the prices - we all have good qualities but we have different solutions, so the conditions determine which supplier will win the competition”* (BOM, Supplier C).

According to the Branch office manager manufacturers do business differently. For instance, *“we have worked with one buyer for many years... two years ago they decided to work with another supplier, and we after get the request to work with the same buyer as second supplier instead. We tried to fulfill the requirements by providing lower prices in two weeks. However, that supplier made their products as it was requested”* (BOM, Supplier C) On the other hand, *“For example, there is another manufacturer, they have chosen to collaborate with only one supplier for the products that we also producing- this means that they don’t want to have second, or third search solution”* (BOM, Supplier C).

Thus, some manufacturers run a different race than others, while other manufacturers have two or three suppliers. These are manufacturers with tight connections with their suppliers; since they have one supplier with no quality problems, they don’t see any need for searching new suppliers. As highlighted by Supplier C, for example manufacturer X has always been different than other manufacturers, such as manufacturer Y. They have different mindset and always want to have the highest quality rather than cheapest alternative. Manufacturer X wants the highest quality whether it is onshore or offshore wind turbines, whereas manufacturer Y wants the wind turbines as cheap as possible. Now, in the offshore site, manufacturer X is the market leader because they didn’t need to change/adjust their onshore wind turbine from the beginning; they just can put their onshore wind turbine directly in the offshore park (Supplier C Interview, 2014).

Supplier Characteristics

It is also acknowledged that manufacturers offer more volume to produce and further demand that the supplier should be able to develop products in cheaper ways *“but it is not so simple that it’s sounds, they go only after lowest price so they are just shopping and are not very cooperative”* (BOM, Supplier C). Furthermore, it is stressed that manufacturers have two up to three-months forecast for how many wind turbines they will sell, but they make a short-term contract, which means one week forecast for delivery. Furthermore, manufacturers determine the share Supplier C will get. Therefore, *“it is difficult for us to know how much we should buy (input) from our suppliers since we really don’t know about the amount of output”* (BOM, Supplier C). Thus, Supplier C finds it very difficult to rely on the buyers’ forecast since this

forecast does not determine the share suppliers might gain of the total sale. It means that manufacturers can change the demand weekly (Supplier C Interview, 2014).” *It changes all the time, which means that we have to do our order for one week. Indeed, it is very difficult as a supplier to fulfill such a request since we have up to 20 weeks delivery time from China, so we take lot of risks by our own, while our customer don’t take any risks”* (BOM, Supplier C).

Market Characteristics

Supplier C stresses the buyer-supplier relationship as important, even though the industry is characterized as the buyer’s market where everything is about the lowest price. In contrast to now, during the past years, manufacturers didn’t just look at the prices, but they also wanted products with top-line quality. At the moment, professional purchasers are working at manufacturers with a completely different mindset. As BOM stresses *“They don’t consider product quality and focus instead on price settings to show the management that they can lower the production cost. Therefore, the supplier buyer relationship has also changed- they are not reliable any more, we deliver today, but we may not deliver tomorrow”* (BOM, Supplier C). Therefore, some companies try to put in a technical purchaser by combining production/development sites and purchasing part in order to focus on quality and not only the price (Supplier C Interview, 2014).

6.2.4 Supplier D

The combination of electronic and mechanical production and software development enables the company to produce advanced electronic, electromechanical, mechanical and software-based products of high quality within both areas. The company is medium sized and is certified for its high quality according to ISO9001: 2008 (Supplier D Interview, 2014).

Product Characteristics

The product range comprises a wide number of sensors for measurement of temperature, Co₂/O₂ and relative humidity. The product range consists of mostly standard sensors as well as customized sensors and solutions. The company has managed to expand its position in sensor products by providing temperature and

pressure measurement with high precision, a high degree of reliability and a long product lifetime under extreme conditions. However, these types of products are considered as simple compared to other components existing in a wind turbine (Supplier D Interview, 2014).

Innovation Characteristics

Regarding the innovation, the global sales manager claims that “*compared to some other components in a wind turbine our products can be consider as relatively simple - it is rather difficult to add ingenuity and innovation into them in terms of radical changes*” (GSM, Supplier D). He also stresses: “*we continuously work with incremental changes to improve the quality of the products and find new solutions to reduce the costs*”. The company’s aim is to ensure that quality improves constantly and stresses that the quality has become an attitude for each individual in the company and the company itself as an entity (Supplier D Interview, 2014).

Relationship Characteristics

As Supplier D is manufacturing relatively simple components, which are difficult to add ingenuity and innovation into, the global sales manager acknowledges “*I honestly doubt that we have the ability to influence the supplier-buyer relationship aimed at increasing the innovation. From our perspective, and related to our products... the innovation is mainly driven by increased price focus from our customers*” (GSM, Supplier D). As a result Supplier D does not have relationships based on long-term thinking and tight partnership to its customers. Instead the relationship is rather based on contracts where price mainly determines the continuity of the relationship. Moreover, instead of just working with a selected number of customers, Supplier D tries to create a wide product portfolio that can serve the entire market. Hence, investments aimed for innovation is focused on developing high quality standardized products, which match the needs of a broad customer base (Supplier D Interview, 2014).

Supplier Characteristics

The company's aim is to ensure that quality improves constantly and stresses that the quality has become an attitude for each individual in the company and the company itself as an entity (Supplier D Interview, 2014).

Market Characteristics

According to Supplier D, the wind turbine industry is the most unreliable industry on the market because manufacturers don't care about suppliers since they go after the lowest price as the main goal (Supplier D Interview, 2014). *"Our former customer needed to lower the price of a complete wind turbine and we received a request to lower the price each year up to 3-5 percent...This is a lot for us. This is not something new... during the last years our customers also requested to lower prices for each year"* (GSM, Supplier D). Therefore, supplier D always needs to come up with new ways to lower the price and improve the quality for survival in this competitive market (Supplier D Interview, 2014).

7. Analysis

The following section will return to our conceptual model in which two different dimensions are discussed. We use our framework and research questions in order to discuss and analyze the empirical findings. By examining the nature of each available supplier types, and comparing their risk return trade-offs through a theoretical context, we will evaluate supplier innovation models and associated supplier relationship. The sub question 1 and 3 will be discussed together since they are interrelated. Moreover, the main points concerning sub question 2 as well as the main question of our paper will be discussed in the last part of our analysis. However, question 3 will also be evaluated in combination with question 2 since they also have a complementary nature.

7.1 Supplier A - Strategic Partnership

Based on the interviews with Supplier A, it is apparent that Supplier A works mostly towards solving complex innovation problems as well as incremental innovation, in order to solve the problems in the entire value chain. This is important for more long-term based relationships with customers, which is also associated with Svensson's (2004) family supplier model, and problem solving supplier by (Kaufman, Wood & Theyel, 2000). Moreover, it was also outlined that Supplier A has co-specialized assets and the necessary know-how for co-creation of radical innovation relationship. Thereby, it is apparent that Supplier A has a long-term intension, experience and understanding about long lasting relationships. Thus, it becomes evident that Supplier A is most likely a strategic partner in the buyer-supplier relationship. In this respect, the Sales Manager of supplier A stresses; *"There are several advantages when you have close and long standing relationship with your customers, ...same language... understand each other, this minimize misunderstandings and create benefits for both parties when it comes to innovation"* (Sales Manager, Supplier A).

Moreover, as previously mentioned Supplier A has *"shared relational specific investment with other firms"* (Supplier A Interview, 2014). It can be understood that even though co-specialized assets in a strategic partnership may lead to high rewards in terms of radical innovation, it also may lead to locked-situation for buyer and a higher switching cost. Thereby, the degree of interdependency from one party to another will determine the degree of control. However, based on our literature review and conceptual framework we argue that in strategic partnership buyer has moderate

degree of control. This since even though the relationship is in line with high-involvement, the long-term nature of the relationship may decrease the potential reward for radical innovation (Tiwana, 2008). More particularly, long-term relationship is not always the best relationship (Gadde & Snehota, 2000).

7.1.1 Supplier B – Business Partnership “case-by-case” co-creation

Based on our empirical findings, it is evident that supplier B has an extensive technological knowledge across industries which makes it possible to provide both radical as well as incremental innovation problems. Furthermore, supplier B has a broad base of customer but also has innovation co-creation with some key customers. Thus, it can be analyzed that supplier B has radical innovation generation as the core business strategy towards its customer. As the global sales managers stresses, “... *offering best solutions drives us be innovative, our target and business strategy is to be innovative*” (GSM, Supplier B), He also adds “...*the buyer’s innovation is created... in here by ‘us’*” (GSM, Supplier B).

Moreover, based on our empirical evidence, it can be analyzed that Supplier B is an independent business partner (Svensson 2004), which also confirms as technology specialist in the literature of Kaufman, Wood & Theyel (2000). Based on our literature review, Supplier B’s technological capabilities can contribute to potentially high rewards in terms of radical innovation in the buyer-supplier relationship (Kaufman, Wood & Theyel, 2000). However, despite the highly potential reward i.e. potential innovation breakthrough, it can be argued that there is a high downside risk exposure in line with low degree of control and high transaction cost. This since the Supplier B is an unknown, independent supplier with high bargaining power, which may lead to high transaction cost - i.e. switching cost (Bensaou 1999; Kaufman, Wood & Theyel, 2000). Based on our empirical finding, we also found that Buyer firm X can minimize the risk of failure via an appropriate management structure and proper safeguard measures (Buyer X, Interview, 2014) Based on the empirical findings, when looking upon the characteristics of relationship in this segment, Supplier B collaborates extensively on a case-by-case basis with buyers, makes the relationship specific investments and offers unique solution.

As Supplier B's Global sale manager stresses “...we often make the relationship specific investments required to generate innovation...” (GSM, supplier B, 2014). Based on the empirical evidence, it can be analyzed that Supplier B is associated with high involvement in short-term basis in the buyer-supplier relationship (Gadde & Snehota, 2000). In addition it can be analyzed that even though this relationship involves a short-term nature, there is a high involvement and interaction which can contribute to radical innovation. “High involvement often coincides with long-term relationships. However, not all long-term relationships do require high involvement and in some short-term supplier relationships high involvement may be an effective approach” (Gadde & Snehota, 2000 p. 312). Consequently, in this type of option the complex innovation problem has an out-put based nature, where the buyer need to solve problem through interaction with external potential suppliers (Felin & Zenger, 2014).

7.1.2 Summary of the main points: Risk-return/ trade-off (Strategic Partnership vs. Business Partnership)

A) The combination of complex/un-specified innovation problems versus well-known suppliers offers moderate degree of control. This since the buyer needs to collaborate closely with the supplier for problem formulation as well as co-creation since the outcome is un-known. Hence, only both-side efforts during the innovation process will determine if the complex innovation problem is solved. Thus, both parties have co-specialized assets which might lead to locked-in situation and high switching cost. This since long-term partnership involves high involvement in long-term perspective between the buyer and strategic partner.

B) The combination of un-specified innovation problem versus new, un-tried suppliers, offers moderate degree of control over the supplier. This means that the level of control has increased as a result of effective management and appropriate safeguard measures such as formal contract, development agreements, non-disclosure agreements, and internal R&D. The supplier has an innovative independent nature and has a business role in the relationship. The buyer and the supplier often initiate business partnership in terms of case-by-case basis between the buyer and the supplier. This means that there is a high involvement relationship with more short-

term nature. However, in this option, there is a moderate downside risk exposure due to increased level of control. However, the transaction cost is higher compared to Supplier A due to e.g. drafting contracts. Nevertheless, in this combination there is a potentially high reward in terms of absorbing new ideas, exploration and radical innovation co-creation.

In sum, achieving exploration –i.e. high rewards - might be more challenging in strategic partnership compared to complex innovation problem solving through case-by-case co-creation with un-tried suppliers –i.e. business partnership. On one hand, invited suppliers are known since they have a presented track record and complementary resources with the buyer, which also decreases the risk for failure and uncertainty. On other hand, if the buyer already knows its supplier, it is unlikely that the supplier take initiative to come up with radical innovation but may have redundant knowledge.

7.1.3 Supplier C – Durable arm’s length relationship

Based on the empirical evidence, it can be analyzed that the innovation generated by Supplier C is simple compared to other components in a wind turbine. As outlined in our empirical findings; *“Although the component is not among the most complex parts in the wind turbine, its technological level still requires a substantial level of engineering expertise and knowledge”* (BOM, Supplier C). We therefore can argue that even though the components are simple –i.e. pre-specified - Supplier C has the ability to provide fully customized solutions according to specifications given from buyer firms. Furthermore, based on our interview it becomes evident that Supplier C has the knowledge to offer practical advices based on the design manual for continuous improvements and fulfilling customer needs. Moreover, It is also apparent that supplier C has an unique selling point in term of exploitation of incremental innovation which is apparent in its positive turnover result, e.g. high quality which lowers customers’ maintain cost (Buyer X, interview 2014; Kaufman, Wood & Theyel, 2000). This is further confirmed by Branch Office manager of supplier C who argues *“...we only focus....on incremental innovation where we improve our products quality”* (BOM, Supplier C).

Another important aspect found in our empirical findings is that Supplier C aims to gain higher volume of business from the buyer firms in order to compete with other competitors. This is due to low margins existed in a buyer's dominated market characterized by short-term contracts offered by buyer firm to several potential suppliers. The findings are aligned with arguments made by Branch office manager who stresses, *"If the competition would be smaller the suppliers could set the prices"*. The Global sales manager of Supplier C also adds; *"We are too many suppliers on the market and we all want a piece of the cake"*. Hence, it can be analyzed that buyer firm has high level of control over the suppliers in this segment. This is partly due to the nature of the component, which is pre-specified and easy to formulate internally (Felin & Zenger, 2014). Also, this is due to the composition of this segment, which has a huge impact on how much buyer firm can control the suppliers and lower the prices through supplier competition. In this respect, our empirical findings confirm that both these aspects affect the relationship type the buyer firm may use for solving simple innovation problems (Buyer X Interview, 2014).

When looking upon the characteristics of buyer-supplier relationship, it is apparent that the level of involvement is low, even though Supplier C can play a role for modification of design, or specification. However, the relationship has more long-term nature, often followed by periods with no business together (Bensaou, 1999). This is further confirmed by Branch Office manager of Supplier C who argues that *"Thanks to our innovation and strong organizational culture -friendship and commitment- it is not uncommon at all to receive a call from an old customer for new orders who has used our products for decades"* (BOM, Supplier C). In this respect, our empirical findings is in line with the literature confirming that supplier-buyer relationship is a typical durable arm's length relationship, in which a supplier with standardized technologies meets customer specifications. These types of suppliers are considered as collaborative specialists (Kaufman, Wood & Theyel, 2000), or friends (Svensson, 2004). Hence, our empirical findings also demonstrate high level of control for the buyer firm and relatively low transaction as contracts are already in place. In addition there is a relatively low switching cost as the buyer can turn to the market to find other alternative potential suppliers (Kaufman, Wood & Theyel, 2000).

Furthermore, we can argue that even though Supplier C keeps the product portfolio at low range and focuses on incremental innovation, Supplier C can be seen as future strategic supplier to buying firms due to its long-term thinking, willingness to interact and the engineering expertise. This is further confirmed by the global sales manager who adds, “... *We are willing to sell our products to one customer and provide them exclusivity*”. Thereby, we can argue that there is a potential high reward for buyer firms in this option. This is partly due to the fact that Supplier C has the ability to understand the specifications, which lowers buyer firm’s supply handling cost, reduces development time and avoids failures. Additionally, Supplier C’s innovative potential may aid buyer firm to lower the supplier base and lower the transaction cost –e.g. contract drafting (Buyer X Interview, 2014). Our empirical findings are confirmed by Svensson (2004) who claims that even though the supplier offers less innovative products, it is an important partner for the buyers’ long-term competitive advantage due to its dedication and dependence to the buyer. Our findings are in line with our literature review by Gadde & Snehota (2000) which highlights the specified interface as the most adopted solution search strategy in a durable arm’s length relationship, used by the buyer firm for utilizing the benefits in terms of potential reward and minimizing the risk.

7.1.4 Supplier D – Arm’s length relationship

Based on the empirical evidence, it can be analyzed that supplier B produces the lowest added value products in the wind turbine industry compared to other options. Thereby, it is apparent that the innovation generated through this open innovation model is simple – i.e. un-specified. Furthermore, it is evident that buyer firm can formulate the problem internally and send out the requirements (Buyer X, Interview 2014; Felin & Zenger 2014). This finding is line with our literature, which is highlighted in Bensaou’s (1999) Market-Exchange Profile and Svensson’s (2004) Transactional Supplier. The findings are aligned with arguments made by the global sales manager who states that “... *our products can be consider as relatively simple - it is rather difficult to add ingenuity and innovation into them in terms of radical changes*” (GSM, Supplier D). Moreover, the empirical findings support the literature regarding the nature of the products, which is based on mature technology and are highly standardized (Bensaou, 1999; Svensson, 2004). Thereby, it is also evident that Supplier D focuses primarily on incremental innovation in order to improve the

quality and lower the price in order to stay competitive. In line with this argument the Supplier D adds: *“we continuously work with incremental changes to improve the quality of the products and find new solutions to reduce the costs”* (GSM, Supplier D).

It can be analyzed that due to low level of problem complexity and investment involved in this type of relationship, buyer firm faces low switching cost and thus can easily shift from one to another supplier in this particular segment. In this respect, it is apparent that the buyer can easily be flexible over its suppliers (Buyer X Interview, 2014). Nevertheless, in this option, buyer has moderate degree of control in terms of generation of incremental innovation; this is due to Supplier D’s independent nature as well as minor technological expertise. In the similar vein the Global sales manager of Supplier D argues, *“I honestly doubt that we have the ability to influence the supplier-buyer relationship aimed at increasing the innovation. From our perspective, and related to our products... the innovation is mainly driven by increased price focus from our customers”*. Thereby, it is apparent that since there is almost no interdependency in this type of relationship both Supplier D and its buyers can also easily shift to another partner in the market (Kaufman, Wood & Theyel, 2000).

Regarding the nature of the relationship, it is evident that there is low level of involvement and the relationship is based on short-term contracts. The empirical findings are aligned with arguments made by Gadde & Snehota (2000) and Supplier D’s interview (2014) who argue that arm’s length relationship offers low-involvement in short-term periods between the parties. Moreover, it becomes evident that commodity suppliers are associated with arm’s length relationship (Kaufman, Wood & Theyel, 2000).

7.1.5. Summary of the main points: Risk return/trade-off (Durable arm’s length relationship vs. Arm’s length)

C) It can be analyzed that the combination of simple /pre-specified innovation problem versus well-known suppliers offers high degree of control over the supplier. This is the safest combination by which the buyer-supplier relationship is described as durable arm’s length relationship. Thereby, the relationship has a long-term nature in line with low-involvement, and sometimes periods with no business together are also

relevant between the parties .We also found that the supplier is considered as family in the buyer-supplier relationship with relatively higher innovation potential compared to arm's length suppliers. Moreover, the buyer has enough knowledge to formulate a simple, pre-specified innovation problem internally, which can be solved through a few numbers of suppliers. Furthermore, there is a clear reward in terms of innovation generation and low transaction cost compared to pure arm's length relationship. Hence, in order to lower the supplier base some firms prefer a few numbers of suppliers who have a better understanding of firm's business. Thus, the transaction cost becomes lower and the rewards might be substantial in terms of incremental innovation offered from these types of suppliers. In sum, the durable arm's length relationship is relatively a safe combination for solving simple innovation problem compared to pure arm's length relationship.

D) Compared to the former option, the combination of simple/pre-specified innovation problem versus un-known supplier offers moderate degree of control over suppliers. This might be a preferred option for very simple innovation problem, since it offers a pure price competition environment where the only focus is on pure standardized components and multiple sourcing. Thus, the arm's length relationship offers low-involvement in short-term periods between the buyer and arm's length suppliers. This option is one of the traditional ways of sourcing which may offer higher transaction cost than the former option, e.g. high supply handling cost.

7.2 Exploration vs. Exploitation / Radical vs. Incremental Innovation

When looking upon the empirical data Buyer X works with both incremental and radical innovation. The aim is to get innovation throughout the entire value-chain in terms of better bottom line cost and increased top line growth, which is required due to both increased demand from end-customers as well as the competitive market. This implies to offer products at the lowest possible cost with the best quality, which requires continuous incremental improvements. However, it is also required to focus on radical improvements to follow the rapid technological development in the industry and to develop new turbines with new technology that can improve the

energy production capacity. *“In simple words you can say that innovation is about top line growth - growth on the sales side, but also on the bottom line- in terms of reduced cost...Thus, Innovation for us can be anything that adds to that bottom line in any stage in the value-chain”*. (VP of Global Sourcing, Buyer X). Thus, it can be analyzed that the goal is to obtain a balance between both radical and incremental innovation to obtain a competitive advantage. This since all companies have limited resources (Soosay, Hyland & Ferrer, 2008) and cannot only focus on either exploration (radical innovation) or exploitation (incremental innovation) since too much exploration without exploitation will generate high experimentation costs and risk taking without correlated benefits. In contrast, innovation based on much exploitation without enough exploration will impede radical breakthroughs needed to stay competitive. Hence, there must be a balance between the two concepts due to the trade-off (March, 1991; Ørberg Jensen & Petersen, 2013). Moreover, the empirics also go in line with our conceptual model and the x-axis, which illustrated the need to balance between exploration and exploitation.

7.3 New Vs. Well-Established Supplier

It can be analyzed that Buyer X constantly try to involve new suppliers into the sourcing of innovation, which is a part of Buyer X strategy. This is sometimes essential in order to get access to radical knowledge not possessed within the existing supplier network and that is a necessary precondition in order to develop new turbine models with new technology. *“For our newest product we worked very closely with a company that normally does solution for aerospace and automotive industry, they were a completely new supplier to us but were actually very integral to us in terms of the new technology in our new product”*. (VP of Global Sourcing, Buyer X). Consequently, even though the intention is not to shift to a new supplier as it often implies substantial switching costs, by replacing a strategic supplier (Bensaou's, 1999; Kaufman, Wood & Theyel, 2000; Svensson, 2004) it may be necessary due to the redundant knowledge possessed by the well-established supplier (Tiwana, 2008). Hence, sometimes an innovation problem requires that the buyer initiate new supplier collaboration with the “right” complementary knowledge for successful solutions (Lau, Tang & Yam, 2010; Rosell, Lakemond & Wasti, 2014). This is further

confirmed by the VP of global sourcing who supports this reasoning. *“I think it is possible in a short space of time to achieve radical innovation with a new supplier”* (VP of Global Sourcing, Buyer X). These findings are in line with Tiwana (2008) who argues that new suppliers have stronger capacity to develop innovative ideas than existing suppliers but on the other side suffer from lower capacity to implement new ideas. In contrast to new suppliers, well-established suppliers are strong idea implementers and thereby involve a lower transaction cost (Tiwana, 2008). This is also illustrated in the empirics where the well-established supplier may not have the same capacity for radical development, but implies a significantly lower transaction cost since the parties have a trusting relationship and a mutual understanding about the business.

Moreover, based on the empirical study it can be analyzed that Buyer X also constantly brings in new suppliers in order to create competition within the existing supplier segment. So called, “outside challengers”, i.e. new suppliers that do not get a huge volume but are very keen to bring new innovation to the table. Thereby, in spite of the higher transaction cost, the company can gain from the exceeding benefits from incremental innovation in terms of enhanced quality and lower costs. *“Our objective is to have the lowest total cost - and our aim is of course to do that with long-term commitment - but we would not just stick to our current suppliers - they have to be competitive as well. But it is also related to the market - our customers want to be provided with best products at the lowest possible prices if they should stick to us”* (VP of Global Sourcing, Buyer X). This statement is in line with the reasoning of multiply sourcing by which the buyer can reap the benefits of lower costs and avoid dependency “locked-in” situation to a specific supplier through competition (Hahn, Kim & Kim, 1986; Dyer & Ouchi, 1993; Porter, 1999; Gadde & Snehota, 2000).

The empirical findings further argue that despite the potential benefits of working with new suppliers it implies a risk of potential opportunistic behavior. This is also highlighted by the VP *“there is always a perceived risk with an unknown supplier”* (VP of Global Sourcing, Buyer X). Additionally, as outlined in the empirical evidence, new supplier relationships are resource demanding. As stressed by the VP *“..you still have to invest the time to make sure that you have a common way of working right. ... the right expectations on behavior ... the right agreements...do we*

meet on key criteria?”. However, it can be analyzed that despite an increased risk, Buyer X is still willing to collaborate with a new supplier, if the potential benefits are higher compared to existing suppliers. Furthermore it is evident that Buyer X utilizes various types of safeguards e.g. the use of references (market-based trust), non-disclosure agreements and development agreements to diminish the potential risk. However, it also became evident that a well-established strategic supplier is associated with lower transaction cost and lower risk in terms of opportunistic behavior. Thus, both our findings and literature indicate that a well-established supplier implies a lower risk since for the longer time the relationship between the parties last, the bonds of trust and commitment become stronger, which bind the buyer and supplier into a close and collaborative relationship (Sriram & Mummalaneni, 1990; Ro, Liker & Fixson, 2008). However, the empirical findings show that *“there are also open suppliers who prefer trusting relationships, have an open book, which means that they neither hide things nor try negotiating for maximum. These reliable suppliers actually do business in an honest way. Hence, in a very short space of time period you can feel that both sides have a very good meeting of behavior. I think it can be more difficult early - trust is built over time, but I think it is still possible”*. (VP of Global sourcing, Buyer X) Thus, if the buyer firm limits itself to only utilize suppliers from the existing network it may restrict the opportunities to develop highly innovative solutions (Lau, Tang & Yam, 2010). In summary, both the empirical evidence as well as our conceptual model indicated both pros and cons related to both new as well as well-established suppliers. Thus, there is a trade-off between the concepts, which demonstrates the practical advantages of ambidextrous inter-organizational relationships (Lin, Yang & Demirkan, 2007; Tiwana, 2008; Bahemia & Squire, 2010).

7.4 Management Profile and Comfort Zone

As can be analyzed from the empirical findings, buyers in the wind turbine industry must handle an extensive supplier base due to large number of components in a turbine. Moreover the maturing process in the industry has forced companies to think about supplier segmentation, account management structure and category management in order to adapt to the changing industry. Thus, it is a very complex task for the buyer to handle the vast number of supplier that all have different

features. In order to determine the characteristics of each individual supplier and thereby choose the suitable relationship posture, Buyer X utilizes a segmentation model. This is in line with the theory that argues that segmentation is one fundamental activity to improve corporate resource allocation through the right type of relationship (Svensson, 2004). Moreover it can be analyzed that the segmentation of suppliers enables the buyer to employ the right type of sourcing for different suppliers in order to achieve innovation throughout the whole value-chain. More specifically, it is important to set the right type of relationship since the supplier innovation associated with the various sourcing types requires different levels of time and investment but also offers different margins of value. This is important since all suppliers irrespective of category constitute an important link in the chain to achieve successful innovation. *“Innovation is highly relevant for all types of supplier relationships”* (VP of Global Sourcing, Buyer X). This is also confirmed by Gadde & Snehota (2000) who argue that all ways for sourcing are viable approaches and have their pros and cons. What is most important is how to handle low- and high –performing relationships and attain control – i.e. imposing restrictions and specifications- without harming supplier’s efficiency, creativity and innovation (Gadde & Snehota, 2000). This is also outlined in the empirics, which shows that Buyer X must find the right mixes of different supplier relationships that match the company’s resources and internal competences, but also one that can offer both incremental and radical innovation. As stressed by the VP: *“There should be a mix of the models in the segmentation. I don’t think you could say there is not any best model of buyer-supplier relationships - I think it is important that for me different models show you different things”* (VP of Global Sourcing, Buyer X).

This reasoning is in line with Bensaou (1999) that there is no type of relationship that can be considered as superior or have better performance to another. What determines the degree of performance in a relationship is dependent upon successful supply-chain management, which implies a match of the optimal type of relationship to the firm’s different products, market, and supplier conditions. Moreover, firm must adopt the most suitable management approach to fit each type of relationship for optimal performance (Bensaou, 1999).

Consequently, as outlined in the empirical data, even though the various models are important tools, they need to be complemented with the right management profile and

right corporate culture in order to be fruitful. *“Models are important - but how the models are implemented and the culture in them is very important. So you can have the same model in one corporate culture and it could absolutely be fantastic - and that is dependent on the leadership style and the culture - and the same model could completely die in an organization where it is simply not welcome. Thus, the prerequisite for a model is actually the culture around it”*. (VP of Global Sourcing, Buyer X).

Thus, it can be analyzed from the empirics that management is the most essential in order to have the right level of flexibility required for successful innovation. This since *“innovation normally does not come from firms with very strict structures such as models – it should be some elements of that, but the behavior is important - how does the managers work”*. (VP of Global Sourcing, Buyer X). This is also confirmed by Bensaou (1999) who affirms *“Supply-chain management failure is the result of a mismatched relational design or a poorly managed appropriate design”* (Bensaou, 1999 p. 37) Finally, it could be analyzed that it is not only about management itself, it is also about the manager’s own personal features. As stressed by the VP *“It is about your own leadership style or comfort zone - also what do you hang on as a person as your competency. I think it is important in terms of leadership skills - you look for people who can manage more and more the relationship with the suppliers and are less into all the specifications of hundreds of details”*. (VP of Global Sourcing, Buyer X). Thus, it is important for firms to not only have a proper management structure, but also the right type of managers with a comfort zone, which entail the ability to cope with different types of relationship that all implies various associated risks and benefits (Ørberg Jensen & Petersen, 2013).

8. The conceptual framework revisited

Through the confrontation of our initial conceptual model with the empirical findings, it could be analyzed that the majority of aspects highlighted initially could be strengthened. However, it also became apparent that some elements in the model diverge from the empirics and thereby challenge the applicability of the model. Consequently, it is necessary to discuss and elaborate the contradictory aspects and revise the conceptual model (see Figure 7).

The two dimensional conceptual model created four different quadrants, all containing a unique type of relationship also found in the empirics. Moreover each quadrant showed the relationships associated degree of control, risk exposure, transaction cost, and potential reward with regards to supplier innovation. When looking upon the empirical data, the level of these parameters were in line with our conceptual model for the three quadrants representing “long-standing strategic partnership”, “durable arm’s length relationship”, as well as “arm’s length relationship”.

Moreover, our model also indicated a balance between exploration and exploitation on the y-axis. This addresses the need to have a balance between involving both new untried and existing well-established suppliers for open innovation. This balance is also found in the empirics, which demonstrate the practical advantages of ambidextrous inter-organizational relationships (Lin, Yang & Demirkan, 2007; Tiwana, 2008; Bahemia & Squire, 2010). With regards to x-axis, it illustrated the need to balance between exploration (radical innovation) and exploitation (incremental innovation), since firms require an appropriate balance between the two concepts due to the trade-off (March, 1991; Ørberg Jensen & Petersen, 2013). This scenario could also be seen in the empirical data which demonstrated the need for both elements in order to cover innovation in the entire value chain.

In addition, it was found in the empirical findings that no type of relationship could be considered as superior to the other in terms of the importance for supplier innovation. This since different supplier relationships offer various types of innovation that all constitute an important part to obtain innovation throughout the entire value-chain.

Hence, firms must adopt the most suitable management approach to fit each type of relationship for optimal performance (Bensaou, 1999). This is illustrated by the four different quadrants that all constitute a unique relationship posture, and the mix between them illustrated through exploration and exploitation on both the x-axis and y-axis. When looking upon the combination new/untried supplier and complex innovation the initial model stated that buyer had a high potential reward, but at the same time a low degree of control causing maximum downside risk exposure. However, from the empirical findings it could be analyzed that by the right mix of formal and informal management tools in combination with safeguard measures it is possible to increase the level of control and thereby decrease the downside risk exposure to a moderate level. Our revised conceptual model illustrates the changed conditions for complex innovation with a new supplier in the quadrant “Initiating business partnership” by the changed degree of control from low to moderate and the level of downside risk exposure from maximum to moderate. Moreover, the quadrant has changed from the previous red color that indicated a sign of warning or attention due the maximum downside risk exposure. Instead the new purple color which has been recognized to stand for creativity and innovation in business contexts, is used to highlight the importance of involving new suppliers to gain from the potentially high reward in terms of radical innovation.

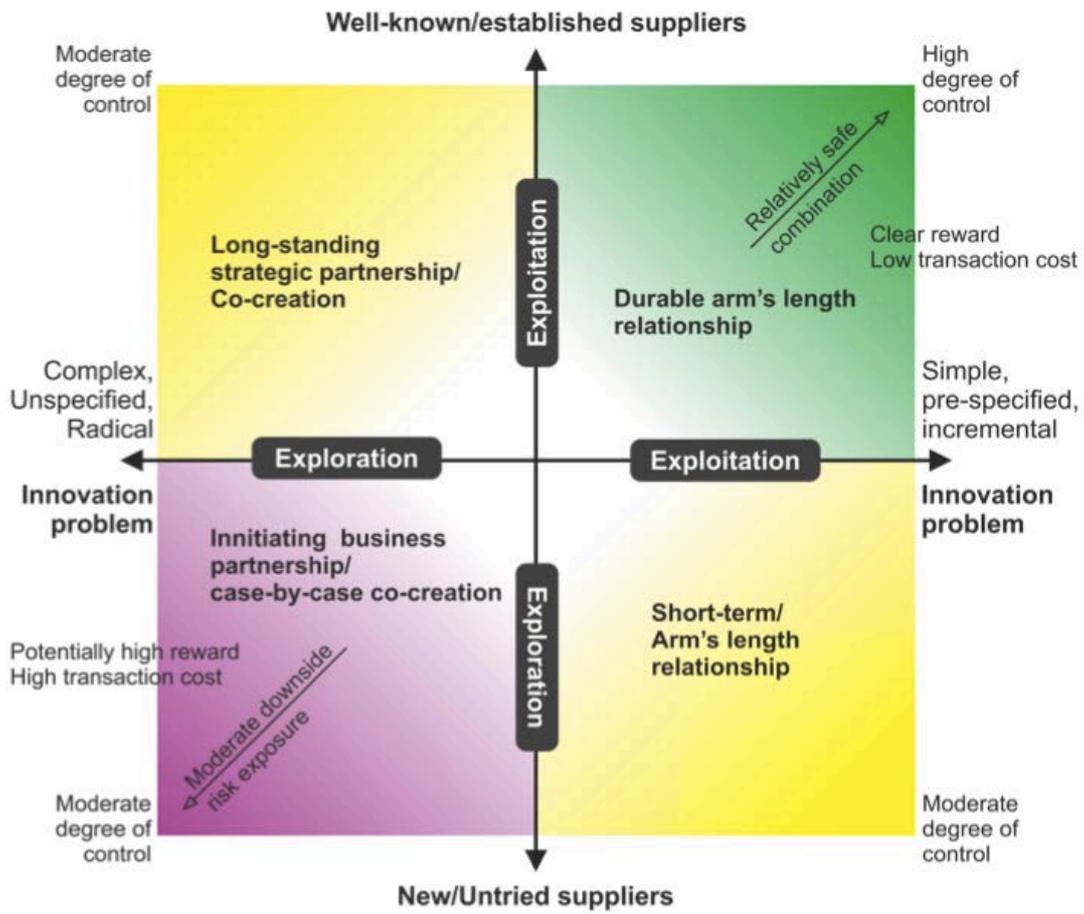


Figure 7: Revised Conceptual Model

9. Conclusion

In order to conclude our research and understand how buyers involve their suppliers in an open innovation context in order to obtain competitive advantage, the final result from our empirical findings and analysis will be discussed.

9.1 Innovation Problem Solving

Based on previous discussion regarding the nature of various dimensions and the existing trade-offs, it has been realized that there are different degrees of problem complexities involved in various external relationships. Thus, in line with increased technological complexity firms develop various open innovation models suitable for solving specific innovation problem. Firms manage these relationships for innovation generation through various strategies. The main outcome is to create a balance between control and flexibility in the supply base. In simple words, if we consider innovation as a problem and managers as problem solvers, the more complex a problem is, the more tacit knowledge exists in that particular supplier relationship. Consequently, regarding the complex innovation problem (un-specified/radical innovation), firms use an interactive interface for problem formulation by which they offer partnership to strategic partner or in some case new potential suppliers for innovation co-creation. Moreover, when the problem is identified firms utilize more centralized innovation governance model in the process of problem solving in order to safeguard the necessary know-how and control co-specialized assets. In this case firms collaborate more closely with suppliers in order to take control over existing know-how and benefit from knowledge sharing activities, learn and solve the complex/radical innovation problem. On other hand, regarding simple/discrete innovation problem (pre-specified/incremental innovation), there is a tendency for creating flexibility in the supplier base. This is due to the non-critical nature of knowledge, thus firms can identify problem mostly internally. Hence, the problem formulation is centrally identified. Moreover, when the problem is identified, firms' supplier interface has a standardized nature –i.e. open bidding or tournament-, by which they broadcast the problem outside the firm's boundaries in order to find the most optimal problem solver, as solution search strategy. Thus, they adopt more decentralized innovation governance model with moderate or low degree of control,

where they send out the requirements and specifications for solving the simple/incremental innovation problem.

9.1.1 Managers Role

After analyzing the wind turbine industry in regards to buyer-supplier relationship and innovation, it became evident that the industry has changed the way buyers configure supplier innovation. This since the global trends have changed the industry from a kind of supplier's market to a buyer's market. As a result, the demand and supply balance has changed in some supplier segments, where a kind of overcapacity has provided buyers with more options and increased bargaining power. As outlined in our conceptual two-dimensional model, buyers have different posture of relationship towards their suppliers, which is different with regard to simple versus complex innovation, and new versus well-established supplier. Most importantly, in order to create innovation in the entire value chain, buyer firms need proper tools such as supplier segmentation and supplier evaluation for configuring the supplier network. This is even more important in such industry as the wind-turbine industry, due to the large supplier base, consists of dispersed competences and capabilities for innovation generation. These models are also essential together with cross-functional teams that cover multiple competences, which enables to set the right type of relationship posture with all suppliers. To select an appropriate regime that implies "one fits all" will impede the opportunity to utilize supplier competences and know-how. This since all suppliers have their own individual features which will guide the most appropriate relationship interface and management. As a result, right management is crucial, if not a precondition for successful supplier-buyer relationships and innovation.

However, to only use formal management tools in terms of models is not enough. To possess the right soft-management skills is also of great importance, which implies managers with strong competences and the right comfort zone. These are managers that can manage the relationship, and not only the hard facts in terms of hundreds of details and specifications. It is important to create the right culture through open communication and have an open mind, since innovation normally does not come from tight structures but from creativity and the freedom of act. These management

skills are especially important in the case of complex innovation where the buyer can gain from jointly innovation problem formulation, and co-creation of innovation solutions with its suppliers. However, it is also important to focus on the company's core competences and specialization in order to be efficient.

It is thus essential for the management to have the right level of flexibility required for successful innovation. This means to involve new suppliers with the potential of high rewards and move away from the traditional way of sourcing. Although it is still important to reap the benefits of already existing suppliers due to lower risk and their capacity to actually implement new innovation more efficiently. However, even though it is important to have a proper management profile in order to determine a suitable relationship that fosters supplier innovation and keeps competition at the right end within each supplier segment, it is also highly important to combine management with proper safeguard measures in order to create the right balance between various types of supplier relationships. Thus, buyer firms can change the conditions from gaining high rewards with maximum downside risk exposure, to instead, reaping the benefits of new potential supplier to maximum reward at a substantial lower risk, avoiding uncertainty and failure. Moreover, it is also important to have the right mix of various supplier relationships as they offer different values in terms of incremental and radical innovation, needed to obtain the right balance between exploration and exploitation.

Moreover, an additional aspect of importance became evident in our empirical findings. Even though it is outside the area of our research, it is still associated with supplier innovation and worth to mention. The findings showed that to be a customer choice of the industry is essential factor in a high technological industry, since being a preferred customer for keeping the supplier satisfied is essential for absorbing the most potential innovation opportunities concerning both new as well as well-established suppliers.

Regarding new supplier, being preferred customer is mostly about having good reputation which will enhance the possibility that new un-known supplier will approach the buying firm as number one to present their latest innovation. This will provide advantages such as getting priority access to novel ideas and decrease the cost

for solution search in regard to problem identification, which will aid the buyer firm to get ahead of the competition. Consequently, it is important to notice that even though the buyer firm cannot offer long term commitment to all suppliers, it is still important to treat the supplier in an open, honest and good way. This will create a good reputation, which indicates long-term thinking to foster supplier innovation. Concerning the well-established supplier, being customer choice of the industry will boost supplier's willingness to be proactive, by investing in new technology, constantly coming up with new ideas and enhancing their alertness to find new innovative solutions without a purchasing order. This will enhance the buyer firm's innovation generation, since the competition exists at the right end, where both new and well-established suppliers compete in a dynamic process for value creation in the entire value chain.

9.1.2 Concluding Remarks

In conclusion, in order to involve suppliers in open innovation and to achieve competitive advantage the buyer must find the flexibility and balance between some essential elements discussed in our conceptual model. This means an appropriate balance between radical vs. simple innovation, new vs. well-established supplier relationships, and the right configuration of the available relationship postures. This will provide innovation throughout the entire value-chain which is the key to sustainable competitive advantage.

9.2 Contribution to Academia

As already stressed, there has been a shift from the previous closed model of innovation, into the concept of open innovation in order to meet an increased global competition and more complex supply chains. In this respect, successful inter-organizational relationships and supplier innovation have become the spearhead of a prosperous strategy to acquire sustainable competitive advantage. However, despite previous research in this crucial research area there is still gaps that must be filled to enhance the understanding of unexplored issues related to this complex phenomenon. As mentioned by Mahnke and Özcan (2006) there exists limited researches that explain how firms exploit innovation by governing their external relations, which is related to the recent and ongoing development within the area of supplier innovation.

Hence, this research contributes to an increased understanding of interfirm relationships and innovation between buyers and suppliers, and the associated risk-return/ trade-offs that firms need to cope with when handling this issue. Moreover, we outline and analyze the various literature and theories interconnected and related to this complex topic and put them into one single phenomenon through an eclectic approach. Thus, our contribution is demonstrated in our conceptualization process, where we discuss the ambidexterity between our two main dimensions; radical vs. incremental innovation and new vs. well-established suppliers, which together establish a strong analytical framework. Our framework and its composing elements, is to the best of our knowledge novel, since it demonstrates how the buyer firm can engage potential, new versus well-established supplier for solving simple versus complex innovation problems, which has so far not been considered in the buyer-supplier innovation framework.

9.3 Managerial Implications

Our research shows the complexities involved in the management of buyer-supplier relationships and supplier innovation. More specifically, it highlights that multiple factors must be taken into consideration in order to fully understand the risks and benefits associated with the available options to involve suppliers into the innovation process of the company. Moreover, there is also different risk-return/ trade-offs involved that can be handled through the right management profile and appropriate safeguard measures. In sum, managers who should handle open innovation with suppliers face a lot of challenges which makes it difficult to gain a holistic perspective needed to make the most optimal decisions.

We have combined different theoretical approaches related to this complex issue into an integrative theoretical framework that is novel, and that in a more comprehensive way demonstrates the concept of open innovation with suppliers. Hence, we believe that our conceptual model can provide managers with valuable insights of the various complexities concerning supplier innovation and demonstrate how the theoretical constructs work in a real life context or through a more hands on approach.

9.4 Suggestions for further research

A comparable case study of our research topic

Based on the literature review and our findings we believe that there is a lack of comparable case studies for our research topic. It is useful for managers to understand a pattern of various supplier innovation models in high technological industries. Hence, it can be suggested to investigate several large manufacturers' innovation models in order to understand their supplier segmentation process/model as well as supplier innovation interface. This is a valuable topic for managers to understand about the ways to involve supplier with regard to innovation generation and pros and cons for each model when they decide to outsource. In addition, it can be interesting to compare companies that operate within industries characterized by different market characteristics such as level of maturity, technological speed, degree of innovativeness, and type of innovation system – e.g. engineering based, science based. This since high technological products based on engineering normally require an understanding about the holistic perspective of the entire product since all components must match and interact in the most optimal way.

Innovation generation in the downstream part of the supply chain (user-innovation)

As mentioned earlier in our paper, the innovation co-creation is less problematic in the downstream part of the supply chain. This is due to the fact that there is less contradictory demand between buyer and end-user regarding the downstream part of the value chain. Nevertheless, it is interesting to investigate what are the existing relationships and innovation models in the downstream part of the value chain? How the buyer firm tries to balance the demand of the end-customer and the suppliers? Moreover, how manufacturers as a middle actor, translate end customers' perspective on innovation towards the supplier and at the same time keep the both parties satisfied?

Value appropriation's influence in the buyer-supplier relationship

As we discussed in our limitation part of our study, value appropriation is a complex but remarkable topic for further research since it is complex but an effective tool, which not only influences single buyer-supplier relationship but also the alliances network (Wagner, Eggert, & Lindemann, 2010). This is especially extremely important for the buyer firms by which they constantly strive to attain property right and stay competitive in the high technological market but at the same time for outside challengers with innovation potential. The suppliers' main challenge is to climb up the value chain and become less dependent by positioning themselves in the center of the alliance network for absorbing necessary knowledge, attaining property rights and secure their long-term profit stream. The potential suppliers' know-how, together with engineering expertise and market experience is extremely important for buyer firms but at the same time challenging to absorb. Thereby, it is interesting to understand how property rights are handled from both sides when they decide to start a relationship for co-creation since the outcome is not clear? And how value appropriation affects supplier innovation and the degree of dependency in their relationship with the buyer-firm or even in the alliances network?

Importance of software intelligence for innovation generation and stability in supply and demand

Electric utilities and big power consumers around the world will spend more than 1.9 trillion on green-energy projects in the next five years, and they are more than ever building renewable capacity. As renewable sources become more admired, stability between supply and demand will be a crucial challenge. The real-time software tools can solve this, namely software intelligence that are connected to the wind turbines, which is further linked by pervasive networks, for ensuring stable power from wind matched to the demand. This is the revolution, namely designing behind the screen, by which the software moves into physical machines. This will further let human assets to put effort on things they are good at, such as interacting with each other and creative thinking. Therefore, wind farms are already loaded with sensors on turbines that control the performance minute-to-minute. These sensor aid the manufacturer to make the most of their assets by forecasting power production, setting dynamic

prices, alerting crews and schedule times for maintenance and etc. In this respect, it is interesting to notice how consumer networks improve companies' understanding of their customers, collecting vast quantities of data for quality, reliability and cost improvements, making complex measurement and accurate prediction at every step of every transaction (Bruner, 2013). Here, even though the subject is not mentioned specifically in our paper we believe that it is an interesting topic to investigate, since software tools become more and more important for more efficiency and innovation generation in the entire value chain. Hence, it is interesting to understand how industrial Internet will bring intelligence and innovation in such capital-intensive industry and create broad value for all players to share? More specifically, how does growing real-time software tools affect the buyer-supplier relationship and supplier innovation in the wind turbine industry but also in other high technological industries?

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11. Appendix

Appendix 1 - List of interviews

Company	Location	Respondent(s)	Number of interviews	Interview Features	Date	Duration
Buyer X	Aarhus, Denmark	1) VP Operations & Analytics Global Sourcing 2), Global Sourcing Specialist	1	Face-to-face English Recorder Used	May 6, 2014	90 min
Supplier A	Aarhus, Denmark	1) Sales Manager 2)Sourcing Manager	2	Skype English Recorder Used	May 8, 2014 May 12, 2014	90 min 60 min
Supplier B	Silkeborg, Denmark	Global Sales Manager	2	Skype English Recorder Used	April 17, 2014 April 18, 2014	90 min 30 min
Supplier C	Silkeborg, Denmark	Branch Office Manger Global Sales Manager	2	Skype English Recorder Used	April 10, 2014 April 14, 2014	90 min 60 min
Supplier D	Aarhus, Denmark	Global Sales Manager	1	Skype English Recorder Used	April 11, 2014	60 min

Appendix 2 - Interview Guide for Buyer

Professional portfolio

1. What is your position in the company?
2. How many years have you worked in the company?
3. How many years have you worked in the industry?

The Company's Innovation

4. Can you describe what innovation represents for your company and what is the main outcome/goal of the innovation?
5. How important are your suppliers for the company's innovation outcome? Are there any hard facts (numbers) of the suppliers' innovation and its outcome?

Supplier innovation models

- 6.1 How does the company involve suppliers to solve innovation problems? More specifically what strategies/types of relationship models are used for innovation in your inter-organizational relationship?
- 6.2 How are these relationship models related to simple versus complex innovation problems (incremental vs. radical innovation)?
- 6.3 How prevalent are the models used in the company/industry?
- 6.4 What would be the best model – most preferred one and has the best innovation potential?
7. Moreover, what are the pros and cons for the models, what are the risks and benefits?
8. Can you describe your supplier selection process for solving an innovation problem? (Simple vs. complex)
9. What types of internal and external uncertainty factors (contingency factors) have the largest influence/impact over the choice of relationship models/strategies?

Value creation, exclusivity and long-term commitment

- 10.1 How do you balance the interest of your company and the suppliers, i.e. how do you create value for both parties in the models?
- 10.2 Do you believe that mutual value is created for both parties?

11.1 How to balance between market competition (short-term relationships) vs. long-term commitment (co-creation), and exploitation vs. exploration (incremental/radical innovation & new/existing suppliers) in order to secure sustainable innovation solutions?

11.2 How is this balance related to exclusivity and switching cost?

12. What are the incentives/motivation that your firm provides in the relationship models to increase suppliers' commitment and innovativeness?

Relationship -specific investments (Safeguard measures), supplier involvement and risks

13. If the innovation requires relationship -specific investments, which party usually has to make this investment?

Furthermore what types of safeguard measures (protection) are attached to this investment, e.g. formal such as contracts or informal e.g. based on trust etc.?

14. If the innovation is based on co-innovation with co-specialized assets, how do you protect the firms' important assets, e.g. specific know-how from dissemination risk?

15.1 What types of directives are used for supplier innovation? Is it strict or more open approach (For example clear specifications of the product/part or more output-based specifications, i.e. what would be a desirable outcome)?

15.2 What are the company's previous experience regarding different directives and timing for supplier integration regarding suppliers' innovativeness and innovation outcome?

Value Appropriation

16.1 How do you solve the issue of value appropriation in the models? For example through contracts specified up-front etc.

16.2 Do you believe that it has hard to negotiate/agree about the value appropriation issue, and does it affect suppliers' motivation/willingness to innovate?

Configuration of co-innovation activities, hybrid of strategies

17. If multiple relationship models are utilized – are they used in sequence?

Industry's specific questions

18.1 Does it exist any evolutionary perspectives?

18.2 If the industry has changed during the recent years, how does this affect the way you as buyer collaborate with supplier for innovation activities?

19. Finally, is it anything else that you believe is important regarding buyers-suppliers relationship and open innovation?

Appendix 3 - Interview Guide Suppliers

Position in the value-chain: (Parts, components, services etc.)

Professional portfolio

1. When was the company founded?
2. What is your position in the company?
3. How many years have you worked in the company?
4. How many years have you worked in the industry?

Company's Innovation self-description

- 5.1 Can you describe what innovation represent for your company, i.e. how do you define innovation?
- 5.2 What is the main outcome/goal of the innovation?
- 5.3 Are there any hard facts in general (numbers) of how your innovation contributes to your Balance sheet?

Supplier Motivation Strategies from supplier's perspective

- 6.1 How does your buyer(s) (manufacturers) induce/motivate you to be innovative? More specifically what strategies/types of relationship settings or models are used for innovation in your inter-organizational relationship?
- 6.2 How prevalent are the relationship model(s) used in the company/industry?
7. How are these model(s) related to incremental vs. radical innovation?
8. If we look into the wind turbine industry, what would be the best model – most preferred one?
- 9.1 Which model is the most promising one and has the best innovation potential? Which model is the most promising one and has innovative potential for radical and incremental innovation?
- 9.2 Moreover, what are the pros and cons for the model(s), what are the risks and benefits? How is value created in each specific model?
- 10.1 How important or how much do you think that your innovation efforts help your buyer (manufacturer)? Do you have any hard facts (numbers) of these improvements/efficiencies?
- 10.2 How can buyers motivate you to engage in innovation activities in most optimal way? (Radical & incremental)

Value creation, exclusivity and long-term commitment from a supplier's perspective

11. What types of internal and external uncertainty factors (contingency factors) do you believe have the largest influence/impact over buyers' decision regarding different relationship models/strategies and open innovation?

12. How does the degree of your dependency to your buyer affect your willingness to share the necessary innovation/ or affect the way you create value -providing exclusivity - to your buyer?

13.1 How do you believe that the balance of interest between your company and the buyer are reflected in the different models, i.e. do you feel that mutual value is created for both parties?

13.2 What are the incentives/motivation that buyers provide in the relationship setting/model(s) to increase your commitment and innovativeness?

13.3 If your company is supplier to multiple buyers (manufacturers) are they using different models/strategies and offer different incentives/motivations?

13.4 How does the buyers approach in terms of a competitive versus cooperative relationship strategy affect the way you offer exclusivity to your buyer?

13.5 What can be improved with regard to the existing relationship between your firm and its buyer(s) and its settings that:

Would improve your willingness to be innovative?

Give the buyer preferential treatment, i.e. invest your resources in one specific buyer rather than one of its competitors and give priority access to your specific know-how?

More specifically what factors is most important for your firm that the buyer currently don't offer and could enhance your innovation efforts?

Relationship -specific investments (Safeguard measures), dissemination risks

14.1 If the innovation requires relationship -specific investments, which party usually has to make this investment?

Furthermore what types of safeguard measures (protection) are attached to this investment, formal and/or informal?
innovation?

Does the safeg

14.2 If the innovation is based on co-innovation with co-specialized assets, how do you protect the firms' important assets, e.g. specific know-how from dissemination risk?

15.1 What directives are used in the relationship setting/model(s) - is it strict or more open approach? For example clear specifications of the product/part or more output-based specifications, i.e. what would be a desirable outcome?

15.2 Do you feel that you have large influence of the innovation? Please give your view/opinion.

15.3 How does the buyer's directives affect your firm's motivation/efforts to be innovative?

Configuration of co-innovation activities, hybrid of strategies

16.1 If multiple relationship settings/models are utilized – are they used in sequence?

In case of sequence use of models - how are they configured in various ways?

17. Moreover, if multiple relationship settings are used, how prevalent is/are each model(s) used in the company and in the industry?

Value Appropriation

18. How do you solve the issue of value appropriation in the model(s)?

18.1 Do you believe that it has hard to negotiate/agree about the value appropriation issue, and does it affect your motivation/willingness to innovate?

Industry's specific questions

19. Do you believe that the relationship setting(s) / model(s) is/are specific for the wind power industry or also frequently used in other industry settings?

20. Does it exist any evolutionary perspectives?

21. Has changes in the industry during the recent years affect the way you as supplier collaborate with buyer for innovation activities/co-development or knowledge sharing?

22. Do you believe that the industry's engineering based nature influence where the buyer's innovation is created?

23. Finally, is it anything else that you would like to add regarding buyers-suppliers relationship and open innovation that is important?