Inter-firm Collaboration for Innovations

Evidence from the Swedish Telecommunications Sector

Master’s thesis within Business Administration

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Abstract

Innovative companies in technologically advanced environments have to deal with the consequences of choosing between a resource based strategy and possibly missing out on the benefits of cooperative knowledge, or collaborating with their network of suppliers, customers and even competitors and risk diluting their competitive advantage. This thesis is concerned with the cooperative aspect within intricate networks of technologically innovative firms. To gain a better understanding of this phenomena, the most innovative sector in Sweden has been chosen for a case study. The purpose of this thesis is to explore the dynamics of innovation within the telecom sector in Sweden, and determine the level of cooperation within the telecom sector, in terms of the flows of information and embeddedness. The method chosen to fulfil this purpose was via a qualitative approach, and in the form of a case study. Relevant data was collected through five interviews with key personnel within the two companies of interest (Ericsson & TeliaSonera), and triangulated with secondary quantitative and qualitative data. Results indicate that the Swedish telecom sector benefits from a fertile environment that fosters innovative activity, and to that reason it has claimed leadership in the worldwide telecommunications industry. Additionally, this same environment promotes collaboration between the different actors in the sector. A closer examination of the cooperation between TeliaSonera and Ericsson in the 4G network roll-out, indicates that the cooperation, albeit being successful, could be ameliorated further through an increased embeddedness of the partnership.
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Abbreviations

EPO European Patent Office
CIS Community Innovation Survey
LMI Lead Market Initiative
OECD Organization for Economic Co-operation and Development
R&D Research and Development
EPC European Patent Convention
TRIPS Trade Related Aspects of Intellectual Property Rights
RTA Revealed Technological Advantage
PCT Patent Cooperation Treaty
NSN Nokia Siemens Networks
1. Introduction

This chapter builds the premise for the entire thesis. The interest for the study is explained in the background and the research problem, where the issues at hand are exposed and awareness for them is raised. Then research questions are formulated in accordance with the research problem, leading to the research purpose.

1.1 Technological Innovations

The term *innovation* has become a widely and sometimes loosely used word within and outside the business realm. Frequently used as a description of exciting and new products, the definition of an innovation need not be restricted to the novelty of the product or service (Christensen & Raynor, 2003). Scholars have been trying to settle on a single unified definition of innovation that encompasses all the aspects of innovative activities (i.e. novelty, change, advantage) (Berthon, Hulbert, & Pitt, 2004). One aspect they all seem to agree on though is the distinction between inventions and innovations, as an innovation is simply an invention that has been commercialized (Solow, 1957). The importance of innovations as a central economic driver cannot be stressed enough (Schumpeter, 1934; Schmookler, 1962). This importance is heightened when the innovations are of a technological nature, as their impact is so intense that sometimes it can change the face of an entire industry (e.g. Apple’s iPod, or the Internet) (Solow, 1957; Chilver, 1991; Syrett & Lammiman, 2002). Introducing technological innovations are in fact any company’s most appealing outcome, due to the immense competitive edge they provide (Lawless, 1996).

Successful technological innovations require a complex combination of human and capital resources in addition to the proper diffusion and distribution techniques to ensure the successful commercialization and adoption of the innovation (Jorde & Teece, 1990). This complexity aspect has sprung a heated debate between the supporters of a protective strategy that advocates the safeguarding of the innovation process as it is regarded as a competitive advantage (Barney, 1991), and the proponents of a collaborative strategy based on knowledge transfer and benefiting from the company’s network and ecosystem (Adner, 2006).

The resource-based view of the firm suggests that companies ought to gain competitive advantage by having valuable, rare, inimitable, non-substitutable resources (VRIN) that they should convert into strategic capabilities and core competencies (Barney, 1991). In the case of a technologically innovative company, the competitive advantage lies in the resources and core competencies that allow the company to be innovative: technological competitive advantage. Maintaining these resources require a so-called *isolating mechanisms* (Rumelt, 1984; Bharadwaj, Varadarajan, & Fahy, 1993) that include information asymmetries i.e. where a player has favourable access to that of another in a transaction.
Keeping this perspective in mind, knowledge is becoming increasingly important, while Conner & Pralahad (1996) even go as far as to say that it is a more important resource than anything else within a resource based perspective.

While the resource based views still hold true to some extent (Gomes, Hoche-Mong, Hoche-Mong, Ivanek, & Wakelin, 1991), more recent theories focus on the collaborative aspect of the innovation process, and stress that technological innovations cannot be developed in a vacuum (Teece, 1990; Jorde & Teece, 1990; Khanna, Gulati, & Nohria, 1998; Adner, 2006). Thus, technological innovations require a complex system of supportive services and technologies, that a company cannot be responsible for singlehandedly (Teece, 1990).

As much as it is a concern for academia, it is a more pressing issue for innovative companies that evolve in a constantly changing and challenging environment. For these companies have to deal with the consequences of choosing between a resource based strategy and possibly miss out on the benefits of cooperative knowledge, or collaborate with their network of suppliers, customers and even competitors and risk diluting their competitive advantage (Conner & Pralahad, 1996). The question then is how do these innovative companies draw the line between the two extremes? Teece summed up this dilemma quite well: “Competition is essential to the innovation process and to capitalist economic development more generally. But so is cooperation. The challenge to policy analysts and to managers is to find the right balance of competition and cooperation, and the appropriate institutional structures within which competition and cooperation ought to take place.” (Teece, 1990, p. 1).

1.2 Swedish Telecom Sector

In the quest of understanding this conundrum, we sought out to find the most innovative environment more specifically with Sweden as the setting, as the country remained at the top in Europe in terms of innovation performance according to the Innobarometer report published by the European Commission (2009). This was both in terms of R&D expenditures and patenting activity (European Commission, 2009). With Sweden as the setting, looking further into the patent data available at the European Patent Office (EPO) one type of technology-sector stands out from all the others, namely the telecommunications sector. According to a calculated revealed technological advantage (RTA) index, it is in fact one of the most innovative in the world, and is by that certainly the most innovative sector in Sweden, in terms of output generated compared to other sectors. For a full background explaining and presenting these results, please refer to Appendix A.

However, the telecom sector does not only look innovative on paper; Edqvist & Henrekson (2002) add to this fact that the Swedish telecom sector with Ericsson at its spire contributes significantly to the manufacturing industry of Sweden and with that the Swedish economy as a whole. In fact, it emerged as the contributor other half of the to the industry total, while also being the largest driver of growth in the R&D component.
of the Swedish national innovation system, with Ericsson's R&D comprising 10 per cent of Sweden's total R&D (Lindmark, Andersson, Bohlin, & Johansson, 2006).

What makes up the Swedish telecom sector? The most recent report on the area focusing on the value chain, by PWC on commission of the Swedish Post and Telecom Agency outlines it as the following; first there are infrastructure players providing cable, fibre, radio links and wireless networks; secondly, network operators lease infrastructure, constructing networks out of it and operate these; thirdly, service providers deliver actual services to end customers (Öhrings PricewaterhouseCoopers, 1999). This relationship is illustrated in Figure 1, below.

![Value chain of the Swedish Telecom Sector](image)

Figure 1: Value chain of the Swedish Telecom Sector (Öhrings PricewaterhouseCoopers, 1999)

Inside the model, TeliaSonera, due to its history, covers all three levels from infrastructure down to service provider. On top of all this, Ericsson, as mentioned is a large player domestically in terms of R&D and production of telecom equipment and network components, along with other global competitors and some smaller domestic actors.

"The telecoms sector is not only one of the fastest growing sectors in the world but also one of the most rapidly changing sectors." (Graack, 1996, p. 341). This indicates how the picture nowadays ought to be quite different.

Today, both Ericsson and TeliaSonera hold large amounts of their respective market shares. Ericsson is a worldwide market leader in mobile equipment with a global 38% market share at the end of 2011 (Ericsson, 2012). While TeliaSonera holds an overall market share of 37.4% as of June 2011 (Gustavson Kojo, Davidsson, & Fransén, 2011). Acs and Audretsch (1988) argue that restricting a study on innovations to large
companies, is reasonable as the sheer volume large innovative companies produce dwarves everything else in significance and by disregarding smaller companies, only a small percentage of innovative activity is forgone. That being noted, this paper will mainly focus on Ericsson and TeliaSonera, partly due to size and volume, as well as partly due to the fact that together they both cover the product spectrum from an idea to a market launch.

1.2.1 Ericsson

Telefonbolaget LM Ericsson (in this thesis referred to as "Ericsson"), was founded in 1876 by Lars Magnus Ericsson, and is today a leading global supplier in telecom related products and services. With a net sales of SEK 226.9 Bn, they are publically traded at NASDAQ OMX Stockholm as well as NASDAQ New York (Ericsson, 2012b). Ericsson has 108,551 employees of which 22,000 are engaged with R&D (Ericsson, Facts & Figures, 2012).

1.2.2 TeliaSonera

Founded as the Royal Electric Telegraph Service in 1853, they later became known under the name Televerket (Swedish Telecommunications Administration) in 1953. Keeping a stable monopoly between the 1910's and 1980's, Televerket was a public company fully owned by the Swedish government, in effect only administering the property (Lindmark, Andersson, Bohlin, & Johansson, 2006). In 1993 Televerket was converted into Telia AB. TeliaSonera is today the largest telecom operator in Sweden and the fifth largest in Europe, running operations in the Nordics, Baltic states, Spain as well as other various Asian countries.

1.3 Purpose and Research Questions

The purpose of this thesis is to explore the dynamics of innovation within the telecom sector in Sweden, and determine the level of cooperation within the telecom sector, in terms of the flows of information and embeddedness.

RQ1: What are the innovation dynamics that characterize the Swedish telecom sector?
RQ2: Is collaboration existent in this sector and to what extent (information flows, embeddedness)?
RQ3: How is collaboration then carried out in such a complex environment between Ericsson and TeliaSonera?
2. Theoretical background

The reader is in this section introduced to several theories relevant to the subject matter. The theories presented here are not only to give the reader an insight to the foundations of the premises of this paper, but also to make sense of the results that follow the empirical collection.

2.1 Dynamics of innovations

Understanding the dynamics of innovation within a specific sector relies on understanding the different sectoral patterns and technological regimes that characterize the said sector or industry. The following theories are deeply rooted in the economics literature, and help shed light on macro-level phenomena, a perspective necessary to understand the environmental aspects innovative firms evolve in.

2.1.1 Sectoral characteristics

It has been noted that: “the patterns of innovative activities have major differences across technologies, but remarkable similarities across countries in the same technology” (Malerba & Orsenigo, 1997, p. 85). This statement refers to the fact that sectors within the same technological field share the same characteristics even though they might be in different countries. Such a conclusion stems from a long stream of research that dates back to Schumpeter’s first articles where he distinguished between two patterns of innovation:

- **Schumpeter Mark I**: a pattern where creative destruction happens as innovations are introduced by non-innovating firms. The novelty and lack of barriers of entry in this ‘widening’ pattern draws in more firms (Schumpeter, 1934).
- **Schumpeter Mark II**: creative accumulation occurs in this pattern resulting from the introduction of innovations by firms who have previously innovated. The ‘deepening’ effect in this pattern makes it harder for small firms to enter the market (Schumpeter, 1934).

Breschi, Malerba and Orsenigo (2000) added four dimensions (i.e. technological regimes), to distinguish between the different patterns of innovation in a specific industry:

- **Technological opportunities**: the likelihood of a firm’s willingness to innovate depends on the research expenditures. High technological opportunities are important incentives for firms to innovate within the ‘widening’ pattern (i.e. significantly important breakthroughs) they can be (Breschi et al., 2000). The dimensions of this regime are the following: **level, variety, pervasiveness** i.e. further applicability of innovations in other sectors; and **source** (Malerba & Orsenigo, 1996).
- **Appropriability of innovations**: the ability and possibility for innovators to protect and profit from their innovations. This has a dual effect on the market. On the one hand, when firms can secure their innovations, they are less reluctant to invest in R&D and are more likely to preserve their competitive advantage. On the other hand, intellectual property protection discourages other firms from using protected material, and might thus hinder technological advances (Breschi et al., 2000). Dimensions include level, i.e. how effective the protection from imitation is; and *means of appropriability* which can be patents, continuous innovation, secrecy or control of complementary assets (Malerba & Orsenigo, 1996).

- **Cumulativeness of technical advances**: innovations are cumulative by nature, and the higher the cumulativeness in a sector or industry, the higher is the propensity for firms to innovate, on a technological level or firm level (Breschi et al., 2000). The relevant dimensions are: *learning processes and dynamic increasing returns at the technology level; Organizational sources; Success breeds success* (Malerba & Orsenigo, 1996)

- **The properties of the knowledge base**: relates to the nature of the knowledge the firm is working with, whether it is generic or specified, tacit or codified, and it’s flow within the organization and the network (Breschi et al., 2000).

### 2.2 Innovation and cooperation

This section aims at providing a theory based background to the issue of inter-firm collaboration, by answering five questions pertaining to why should innovative companies engage in collaboration; with whom and when; what should be exchanged; and how should this exchange occur?

![Figure 2: Innovation and collaboration](image)

*Figure 2: Innovation and collaboration*
2.2.1 Necessity and benefits of Inter-firm cooperation for innovations

As the success of an innovative product or process relies on the profitable commercialization of the innovation (Jorde & Teece, 1990), innovative companies cannot solely rely on the technological breakthrough of their innovations. A system of complementary assets is needed in order to bring those innovations to the market (Figure 3) (Teece, 1990). Advanced technological innovations cannot be created or distributed in a concealed environment. It is indeed rare that firms, regardless of their size or access to resources, possess all the organizational capabilities to develop, manufacture and distribute a complex technological innovation (Cantwell, 1989).

Figure 3: Representative complementary assets needed to commercialize technological know-how. Adapted from Teece (p.9, 1992)

The network of suppliers of complementary assets is important in bringing out successful innovations. In addition to the core technological know-how, a company should surround itself with a network of complementary asset providers (i.e. competitive manufacturing, distribution, services and complementary technologies) (Teece, 1990). Since not all innovative companies can perform these tasks in house, nor can they simply acquire these services, “to be successful, innovating organizations must form linkages, upstream and downstream, lateral and horizontal” (Teece, 1990, p. 22).

More recent research calls this network an innovation ecosystem (Adner, 2006). It is basically the same idea of surrounding the core technology producing company with competent and competitive companies and entities that are able to support the
technological advances and help develop by-products and services. Adner (2006) stressed on the importance of including the ecosystem in the technological development, through inter-firm cooperation and collaboration. Adner’s argument builds on the premise that technologically innovative firms cannot withstand to successfully commercialize their innovations if their ecosystem is not on the same level of technological prowess. Many innovations have failed at first, not because the market wasn’t ready for them, but because the industry was not well equipped to handle them (Adner, 2006). It is therefore necessary for innovative firms to foster inter-firm learning amongst their network of complementary assets providers, and the most effective and efficient way to do so is through inter-firm cooperation (Ahuja, 2000).

The following sections will cover the different facets of inter-firm cooperation in highly innovative environments. Emphasis will be particularly added on the appropriateness of collaboration depending on the context, and the different organizational and governing issues that should be taken in consideration.

2.2.2 Levels of Collaboration

Inter-firm cooperation takes place on different levels of the value chain within a specific sector. It can range from collaboration between a firm and its suppliers to a full-fledged joint venture between ardent competitors (Sydow & Windeler, 1998). The cooperation’s success or failure does not only hinge on the level of the relationship, but also on which stage of the innovation process the said relationship has been initiated.

2.2.2.1 Inter-firm networks

Ahuja (2000) examined the relationship between a firm’s position in the network and the number of ties it maintained, and its consequences on the company’s innovative output. Empirical results suggest that indirect ties are preferred to direct ties in efficiency and effectiveness. Multiple indirect ties across the firm’s network have a positive effect on the company’s innovative output while reducing network maintenance costs (Ahuja, 2000). Teece (1990) distinguishes between two levels of inter-firm cooperation:

- Coupling developer to users and suppliers - **Vertical Integration**

Commercially successful technological innovations benefit from linkages between technical competences, entrepreneurial and managerial skills in addition to an insightful user perspective (Teece, 1990). Vertical integration with suppliers and customers strengthens the value chain when the communication channels are open and inclusive. In addition, Ragats, Handfield and Scannell (1997), argue that including the suppliers in the entire innovation process helps cut costs, improve quality of the products and reduce the development and production time. While including the customers has been empirically proven to increase product quality, when the company follows a customer-oriented strategy (Berthon, Hulbert, & Pitt, 2004). In addition to the mediating effects customers
can have when included; these effects include and are not restricted to: enhancing the supplier’s offerings, providing a better service, enhancing productivity achieving superior quality etc. (Ngo & O’Cass, 2012).

- Coupling to competitors - Horizontal Integration

The second and most controversial level of cooperation is the horizontal integration where the company is collaborating with its competitors (Teece, 1990). Competition is essential for a healthy network dynamic as it creates incentives and opportunities for firms to innovate and compete with each other. However, cooperating with competitors is also benefiting in some cases where doing otherwise harms the entire network (Hagedoorn, 1993). The knowledge spill over that comes from cooperating with direct competitors benefits everyone involved in the long run (Jorde & Teece, 1990).

2.2.2.2 Stages of the innovation process

The level of embeddedness of collaboration can be examined and observed depending on which stage of the innovation process the cooperation occurs (Gassman, 2006). Several researchers advocate the importance of including third party actors in the innovation process and at different stages.

Several attempts have been made by researchers to describe the innovation process in a single model. However, the construction of a single generalized model has been hindered by the diversity of the innovation processes across disciplines and technologies (Saren, 1984). It is however safe to assume that each innovation process, whether it is linear or multi-dimensional, consists of several steps that are performed within specific departments (Saren, 1984).

Saren (1984) reviewed the different types of models according to the different technological dimensions of the companies and their production facilities. He concluded that most companies follow a departmental-stage model (depicted in Figure 4). Where the innovation idea goes through research and development first before proceeding to the different stages. This model, albeit being simplistic, is the most common amongst R&D based industries (Saren, 1984).
2.2.3 Knowledge transfer

When firms cooperate, the most often exchanged commodity is knowledge (Zack, 1999). Knowledge is the result of an intricate process that includes, but is not limited to: perception, interpretation and understanding of data and information (Zack, 1999). Knowledge-based views of the firm have prompted a new line of research in business administration: knowledge management, within which knowledge transfer is a central issue (Basadur & Gelade, 2006). Knowledge transfer is an important component of inter firm cooperation and (Uzzi B., 1997) understanding knowledge types and knowledge flows will support the understanding and defining of the type and embeddedness of collaboration.

Regardless of the transfer itself occurring within the same organization or between two different ones, it is always vital to determine the nature of the knowledge in the exchange and the channels being in use (Uzzi B., 1997). When transferring valuable and scarce knowledge it might not always elicit positive attitudes among members of an organization. Sharing, however, can sometimes be a necessity in developing and enhancing one’s own knowledge in order to contribute to collective objectives (Johnson, 2005; Hackney, Desouza, & Loebbecke, 2005).

Although there is rich literature on the learning occurring within firms, while studying the learning within markets, Uzzi and Lancaster (2003) looked more closely at how learning occurs between firms. In the process of doing so, the alternate perspective of private vs. public knowledge (Uzzi, 1999) was opted for. Uzzi and Lancaster (2003) attested this dimension to address problems in the setting between firms: knowledge, access, verification and misappropriation; thus having the benefit of being more appropriate for analyzing inter-organizational knowledge transfer. Parallel to this new dimension in the study, the level of embeddedness between the exchanging parties was also taken into account. The results of the study indicated that it held a great deal of significance as to what type of relationship was opted for between parties; with embedded ties, private knowledge was freely shared and explorative learning occurred; with reduced embeddedness in the relationship, public knowledge abound as the learning was increasingly exploitative (Lawless, 1996; Uzzi & Lancaster, 2003).

Choosing the right kind of relationship is key in better benefitting from the knowledge transfer, and its subsequent learning outcomes (Das & Teng, 2001). In the case of a customer-supplier relationship, knowledge is dispersed across two or more partners, as both companies will have to share their information with their sub-suppliers and other partners that are part of the production network (Fagerström & Olsson, 2002). This results in companies not divulging their private knowledge for fear of it being passed on to the other sub-suppliers or customers. Knowledge management provides the tools for such a cooperation effort to learn and exchange knowledge effectively. In order to reduce risks in knowledge transfer between suppliers and their customers, knowledge has to be made explicit in order to avoid delaying the production process (Fagerström & Olsson, 2002). As for the risk of having the explicit knowledge transferred to other
network components, there aren’t many straightforward ways better than specifying the knowledge sharing conditions in the cooperation contract (Basadur & Gelade, 2006).

### 2.2.1 Strategic alliances

Teece’s argument for inter-firm collaboration to guarantee the success of technological innovations relies on the fact that no single firm can assure all the necessary services needed for the diffusion of their innovation in-house (Teece, 1990). Globalization adds another argument in favour of inter-firm collaboration for innovations, as few firms can replicate their value chain across the globe without losing on efficiency and effectiveness, hence the need for these firms to form partnerships with key suppliers and customer, as well as competitors in some cases (Narula & Hagedoorn, 1999).

As firms get together in various efforts to combine forces in the market, there are different paths to take, some intertwining the parties, with others keeping the parties at a comfortable distance from each other. As discussed in the previous section however, the type of knowledge and learning occurring is affected by the embeddedness of the firms involved. With no wish of fully merge together, yet arms-length distance being found unsuitable, a strategic alliance is a possible tactic for better organizational learning between firms (Mowery, Oxley, & Silverman, 1996).

Strategic alliances are inherently different from customer-supplier networks in that they combine the cost economizing motivation of coupling with a supplier or a customer with a strategic motivation that can vary from agreeing to establish a common standard to securing a long-term profit optimization (Narula & Hagedoorn, 1999).
In definition, a strategic alliance could be described as: “an agreement between firms to do business together in ways that go beyond normal company-to-company dealings, but fall short of a merger or a full partnership” (Wheelen & Hungar, 2000, p. 125). These alliances may vary in level of formality, commitment and cooperation, thus appearing in many different forms, one particularly interesting level of distinction between strategic alliances classifies these alliances according to the interdependence allowed in the partnership. Figure 5 is a graphic representation of the different types of inter-firm cooperation and the extent of interdependence as well as the level of internationalization these alliances permit (Narula & Hagedoorn, 1999):

![Organizational modes of inter-firm cooperation](image)

Figure 5: Organizational modes of inter-firm cooperation adapted from Narula & Hagedoorn (p. 290, 1999)

What is common between all these types of strategic alliances however, is that the firms involved together strive to achieve objectives that are strategically important and mutually beneficial (Elmuti & Kathawala, 2001).

The main premise being established, there are naturally further reasons to such an agreement. Some major reasons according to Elmuti and Kathawala (2001) may be: (1)
Growing and gaining entry to new markets; (2) gaining access to new technology earlier and at a lesser cost than that of competitors; (3) sharing R&D costs and diversifying risk in regards to finances; (4) securing a competitive advantage. In the case of a technology oriented strategic alliance, the appropriability of innovation can be improved on significantly as companies can benefit from each other's technological advances without infringing on patents or intellectual property rights, and henceforth improving the technological innovation (Narula & Hagedoorn, 1999; Breschi et al., 2000).

With certain rewards there sometimes can be risks involved, the main dimensions to take into account in regards to risk in this matter are relational and performance related pitfalls and setbacks (Elmuti & Kathawala, 2001). The former one relates to chemistry, trust and coordination; while the latter one relates to differences in objectives, operating procedures and attitudes (Elmuti & Kathawala, 2001).

As for knowledge transfer within strategic alliances, the more interdependent is the relationship the more tacit and implicit knowledge is likely to be transferred between the two parties (Mowery, Oxley, & Silverman, 1996). Mowery et al. (1996) suggest that equity arrangements such as joint ventures for example promote greater knowledge transfer as the partners are locked in a contractual agreement that encompasses a shared risk between the partners.

Consequently, the success of a strategic alliance lies upon balancing the risk and responsibilities of the involved parties, as well as making sure objectives and guidelines are set prior to cooperation (Kale & Singh, 2009). The most central factor however is the choice of partner; a firm should pick a partner whose characteristics are in line with the strategic objectives at hand, hence a partner with limited experience within a certain type of technology might hinder the knowledge and experience sharing within such an alliance (Mowery et al., 1996; Kale & Singh, 2009).

### 2.3 Summary of theoretical background

The complexity of innovations in technological fields is not only the product of the sheer volume of constant technical and scientific breakthroughs; it is also the product of an intricate dynamic. This dynamic encompasses the specificities of the sector that might foster or hinder innovative activity depending on whether the characteristics (i.e. technological opportunities, appropriability of innovations, cumulativeness of technical advances, the properties of the knowledge base) are fulfilled or not (Breschi, Malerba, & Orsenigo, 2000).

Successful technological innovations, whether they are of a radical (completely new), incremental (builds on previous innovations) or disruptive (creates a new innovation path) nature, require first of all the complete control and mastery of the core technological competence (Leifer, Colarelli O’Connor, & Hubs, 1993; Christensen & Raynor, 2003). The innovative firms are bound to peruse their resources and capabilities in order to create successful technologies. However, without the support and help of a
network of firms that provide additional technological know-how, distribution channels, and help diffuse the technology, all the innovative efforts may fall short (Teece, 1990). In addition cooperating and relying on a network of supportive firms, the technologically innovative companies should also make sure that their ecosystem is brought up to speed on the technological prowess (Adner, 2006).

And because of the aforementioned business dynamics, it is of the utmost importance for firms to maintain a healthy balance between competition and collaboration (Jorde & Teece, 1990). On the one hand, competition drives the innovation forward and opens up new and unexplored opportunities; on the other hand, collaboration strengthens the ties between the different components of an industrial value chain and allows for a deeper exploitation of technical knowledge (Jorde & Teece, 1990).

The way collaboration is planned for and carried out determines the success of the partnership or in the less fortunate cases, its failure. The level of the collaboration has an impact on the embeddedness and involvement of the actors (Uzzi B., 1997). When firms collaborate for innovation purposes, they can couple with their immediate network of suppliers and customers, or chose the less travelled road of coupling with their direct competitors (Ahuja, 2000). Each of these collaboration levels implies a different organizational outcome. As the companies involved in an innovative collaboration need to organize and regulate the knowledge exchange and decide upon the type of contractual or arms-length collaboration agreement.


3. Method

In this chapter, a description of the methods used in data collection and analysis is provided along with motivations as to why these methods have been chosen as means of collecting meaningful knowledge about the problem at hand.

The figure above is a brief representation of the research design used in this paper. A qualitative research approach was followed in order to fulfil the purpose of exploring the innovation dynamics and determining the level of collaboration within the Swedish telecom sector. The following is an account of the measures undertaken to decide on the method approach, collect and analyse the data.

Figure 6: Qualitative Research design, adapted from Williamson (2002)
3.1 Research approach

3.1.1 Positivism vs. Interpretivism

Two traditions mainly dominate research in social sciences: positivism and interpretivism (in other terms: hermeneutics) (Williamson, Burstein, & McKemmish, The Two Major Traditions of Research, 2002). These two approaches have been widely discussed and compared to each other in terms of pertinence and validity, but have always been found dichotomous (i.e. very different). Positivist research uses similar methods to those of natural sciences, with the purpose of linking cause and effect in findings achieved through experimentation (Dick, 1991). The methods used in the positivist approach are of a quantitative nature, while interpretivist research focuses on finding the meaning in social phenomena using qualitative methods. Interpretivist build on the construct that social sciences are studying phenomena that have resulted from human beings’ actions, and can therefore not be studied using the same methods as for natural sciences (Williamson et al., 2002). Purely positivist or interpretivist research is seldom found, but rather a mix of both with one dominating approach is the norm in research (Williamson et al., 2002). As far as this paper is concerned, an interpretivist (i.e. qualitative) approach is preferred to a positivist one, due to the nature of the topic at hand which involves exploring and creating an understanding of a system’s collaborative efforts, which concepts are created and interpreted directly from minds of people.

3.1.2 Deductive vs. Inductive

Reasoning styles have also been discussed and a distinction has been made between: (1) Deductive reasoning: where the argument moves from general principles/doctrines to particular cases/illustrations (Williamson et al., 2002). Generally this reasoning is used in instances where a theory is used to explain or confirm a phenomenon. (2) Inductive reasoning: begins with articular cases/illustrations and ends with general principles/doctrines (Williamson et al., 2002).

This thesis follows a deductive reasoning, as it starts by stating the phenomena to be studied, then lists the theories and principles relating to the field of study, to later lead to an analysis and explanation of the phenomena.

3.1.3 Quantitative vs. Qualitative

Quantitative research aim to test a theory, by processing amounts of data and deducing whether it holds true or not, while qualitative research explore an area where variables are unknown (Creswell, 2009). As the purpose is to form understanding of an environment and collaboration occurring within it, as well as how the one affects the other, the study leans towards a qualitative approach in order to develop a conceptual image (Morse, 1991). The qualitative research, which in this case will be limited to a time
frame and between certain actors is most fittingly carried out in a case study, explained in the following section (Baxter & Jack, 2008).

3.2 Choice of method: Case Study

As discussed, the paper opts for a study approach, in which an illustration of the relationships and dynamics in the telecommunications sector is provided, focusing on interplay between Ericsson and TeliaSonera specifically concerning the fourth generation of networks (4G). The reasoning is that when conducting an exploratory study such as the one concerned in this paper, gaining understanding of a phenomenon within a certain time frame, a case study is appropriate (Yin, 2009). Especially when current knowledge is lacking as to how and why things are the way they are (Darke & Shanks, 2002, cited in Williamson, 2002). A well-performed case study may also result in new research directions or challenge current theories (Saunders, Lewis, & Thornhill, 2007), which is central to this thesis.

In short, there are mainly explanatory case studies that aim to answer questions to causal links that are too difficult to answer through a survey; exploratory case studies that seek to investigate phenomena without any one clear set of outcomes; descriptive case studies in which a certain happening and its context are described (Yin, 2009). Stake (1995) also lists the intrinsic type where the researcher's own interest is central to better understand a certain case but not build theory; as well as the instrumental case study in which there is a particular research question that could be answered by looking into a particular case. The latter is also supportive to the main purpose of the research, details ordinary activities and may help to refine theory (Stake, 1995). With that in mind, the instrumental case study is the most fitting as the telecom sector in general and the 4G act as a supportive case to the main purpose of determining the level of collaboration and embeddedness within the sector, and specifically between Ericsson and TeliaSonera.

With that brief review on the different types of case studies, the type of case study opted for in this paper is the instrumental one, as there is a clear question in mind, how the collaboration, exchanges of information and general embeddedness between the two big players of the sector function together.

To answer a research question, a researcher may not only conduct a single holistic case study but also multiple case studies (Yin, 2009), or a collective case study as Stake (1995) refers to it. Regarding this matter, the choice falls upon a single holistic, case study. The reasoning behind the choice is that the 4G development and launch is a recent phenomenon including the two by far biggest players in the highly innovative Swedish telecommunications (Lindmark, Andersson, Bohlin, & Johansson, 2006), comprising the main bulk of activities within the area of study.

The time frame should be taken in consideration here, as it only allows for a single case to study, since each generation of network infrastructure is produced with a considerable
time period separating it from the last (Yin, 2009). And in light of the new technological
development the sector has seen since the third generation (c.f. section 4.1), the
circumstances have changed and have made the 4G case quite unique. Thus, it would
serve no purpose to include any other cases. With Ericsson and TeliaSonera in focus, it is
a clear choice to conduct a single holistic case study, allowing the authors to gain as deep
understanding as possible about the structure of the telecommunications sector.

3.3 Data collection

Qualitative researchers have tapped into a wealth of ways to collect data relevant to the
study of human experience; interviews, focus groups, documentary and visual data are
just a few examples (Polkinghorne, 2005). Often a combination of these methods is
required to paint a wholesome picture of the subject at hand, and often several data types
are needed in order to offer several perspectives (Saunders et al., 2007). The case study at
hand consists of a collection of primary and secondary data of both qualitative and
quantitative nature, in order to offer the reader an overall idea of the state of the art in
the Swedish telecom sector in terms of innovation dynamics and inter-firm collaboration.
The following will discuss and describe the means and methods used to gather the
empirical data used in this thesis.

3.3.1 Secondary quantitative data collection

Quantitative data was first collected for the purpose of determining and motivating the
choice of sample; this process is detailed in Appendix A. The primary focus of the thesis
was to understand and explore how highly innovative companies in challenging
environments cope with the dilemma of choosing between a protective strategy and a
collaborative innovation strategy.

First of all, an innovative environment needed to be determined, as the subject of the
thesis requires observations from highly innovative industry. Several measurements were
evaluated before settling on an adequate index to measure the innovativeness of an
industry/sector (c.f. Appendix A). Patent data was obtained from the European Patent
Office (EPO) (European Patent Office, 2011), and was used to compute the RTA
(Revealed Technological Advantage) index for Sweden. Only granted patents were
considered as they are better indicators of the quality of the patent and are therefore
more relevant to measure (Archibugi & Pianta, 1996). Results of that analysis showed
that Sweden holds a worldwide comparative advantage in terms of patenting activity in
the telecommunications industry. These results have contributed to building the premises
of this thesis as they were used to define the sample of interest.

3.3.2 Primary qualitative data collection: Interviews

Interviews have been chosen as a method of collecting primary qualitative data relevant
to the purpose of the thesis, being the most relevant qualitative approach (Bryman &
A strength with interviews as a data collection method is that the personal nature of it, the response rate to each question is likely to be higher than that of a traditional written questionnaire (Berg, 2001).

“Interviews are inherently social encounters, dependent on the local interactional contingencies in which the speakers draw from, and co-construct, broader social norms” (Rapley, 2001, p. 303). A successful interview therefore, depends not only on the interviewee’s ability to answer questions with certainty and honesty; it is also the responsibility of the interviewer to create a suitable and comfortable atmosphere. Williamson et al. recommend interviewers to be neutral and dispassionate while at the same time encouraging participation by being enthusiastic and showing interest in the interviewees’ answers (2002). This has been taken in consideration when conducting the interviews. However, as the interviews were exclusively done via telephone, there was an inability to read the body language of the interviewee, on the other hand, the interviewee is not as likely to be influenced by any visual cues from the interviewers (Saunders et al., 2007).

### 3.3.2.1 Questionnaire

The purpose of the thesis is to investigate the highly innovative companies’ setting; to what extent they collaborate and create an understanding regarding the inner workings of the sector itself. The type of findings needed to answer this purpose is not of an exact nature, and relies on the far-reaching experience and expertise of the interviewees. Therefore, an open-ended questionnaire was more relevant in this case than a close-ended questionnaire, during the interviews (Berg, 2001). The latter would especially not have been appropriate because it does not allow for discussion and would not as effectively reveal interesting insights not widely known / or / requires the authors to have an almost greater understanding of the phenomenon than the interviewees themselves. Open-ended questions return useful information when the subject of research is complex and does not have a finite or predetermined set of responses (Carey, Morgan, & Oxtoby, 1996) and provides as many details as possible.

Questionnaires were tailored to the interviewee’s area of expertise, in order to get the most out of their perspective and experience (Berg, 2001). However, a standard questionnaire was used as a guideline for the interviews, which was later, tailored to the breadth of experience of the interviewees (c.f. Appendix B). Both authors have conducted the interviews, which has allowed for different point of views to be expressed and covered in the form of a discussion. The conference format was preferred to a one sided phone conversation in this case.

### 3.3.2.2 Interviewees/Sample

The interviewees were chosen on the basis of their relation to the field of study and expertise on the topic at hand. Due to the nature of the data that needed to be collected, an expert opinion was necessary to validate the results and findings (Bryman & Bell, 2007). A first selection of the sample was performed by looking through the company
websites for key employee profiles within the relevant areas and divisions (i.e. Business Relations, Management and Strategy, Innovation and Business Development, Research and Development). Thereafter the companies’ respective communication and public relations channels were contacted, and the thesis subject was exposed. This measure was necessary in order to get approval from the companies in order to conduct the interviews. Later on, contact was established with the suggested persons that were deemed to have valuable information related to the thesis topic.

For the sake of anonymity and protecting the interviewees’ identities, they were all pooled in the same panel, regardless of their company affiliations. However, since validity and importance of results are drawn from the expertise and knowledge of the interviewees, their job titles were left visible.

Table 1: Interview details

<table>
<thead>
<tr>
<th>Job title</th>
<th>Date</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Director of Key Business Unit</td>
<td>29-03-2012</td>
<td>60min</td>
</tr>
<tr>
<td>Vice President</td>
<td>18-04-2012</td>
<td>45min</td>
</tr>
<tr>
<td>Vice President</td>
<td>23-04-2012</td>
<td>60min</td>
</tr>
<tr>
<td>Business Developer</td>
<td>09-05-2012</td>
<td>30min</td>
</tr>
<tr>
<td>Vice President</td>
<td>11-05-2012</td>
<td>40min</td>
</tr>
</tbody>
</table>

As a means of preserving the anonymity of each individual, and in order to be able to identify the companies, the interviewees are referred to as E1, E2 and E3 for Ericsson interviews, and TS1 and TS2 for TeliaSonera.

### 3.3.3 Secondary qualitative data collection

Secondary qualitative data was collected for two ends. The first use of secondary qualitative data was to corroborate statements from interviewees, as well as to complete the picture of the study as a whole (Creswell, 2009). An additional reason to collect secondary data from annual reports and different publications was to save interviewing time to focus on more complex questions for the interview subjects that also suffer from limited time.

Importance and priority was given to trustworthy sources such as official company press releases and annual reports, in order to make sure the data obtained was reliable (Creswell, 2009). Alternative reliable sources were also considered as a means of double-checking the validity of the data, and also to get a more critical look at the observations (Saunders et al., 2007). These alternative sources consisted of publications from the Swedish telecom regulatory institution PTS, and well established news organizations.
3.4 Data analysis strategy

Analysing qualitative data can be very time consuming, while the researcher is thus recommended to start the process simultaneously to the data collection (Strauss, 1987). In accordance with Strauss, the data analysis planning started with the data collection process. The research questions served as guidelines to the data collection, reporting and analysis. The results were divided into themes according to which research questions they answer, and which theories fit to this particular data. The table below showcases the questions and their corresponding themes.

Table 2 Research questions and data analysis themes

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>RQ1: What are the innovation dynamics that characterize the Swedish telecom sector?</td>
<td>Innovation in the Swedish telecom sector (i.e. sectoral patterns, innovative firm characteristics)</td>
</tr>
<tr>
<td>RQ2: Is collaboration existent in this sector and to what extent (information flows, embeddedness)?</td>
<td>Innovation collaboration (i.e. Inter-firm collaboration &amp; embeddedness within the network)</td>
</tr>
<tr>
<td>RQ3: How is collaboration then carried out in such a complex environment between Ericsson and TeliaSonera?</td>
<td>Inter-firm collaboration between TeliaSonera and Ericsson for the 4G network – specific case.</td>
</tr>
</tbody>
</table>

The case study was firstly written in accordance with the aforementioned themes. In order to make sense of the data collected, interviews were transcribed as soon as the interviews were conducted. Then the transcripts’ contents were color-coded depending on the questions and themes, and then all related data was pooled together. This codification has allowed the authors to make sense of the interviews in a wholesome manner, allowing them to gain a holistic view of the data (Pope, Ziebland, & Mays, 2000). As for the data reduction techniques used, repetitive information was omitted and long answers were shortened to the most interesting snippets as means of avoiding redundancy and lengthy text (Pope et al., 2000).

3.5 Reliability and Validity

Reliability in the words of Yin (2009) and the context of a case study, is that of reducing the amount of errors. Triangulation is one measure to aid the reliability of a study (Creswell, 2009). There are two ways to conduct triangulation, either through method triangulation by combining two methods of data collection; the other is sources triangulation, which is used to crosscheck the consistency of information, derived from primary sources (Williamson, Burstein & McKemnish, 2002, cited in Williamson, 2002). In this paper both method triangulation is carried out in drawing the sectoral pattern telecom sector, as well as sources triangulation to corroborate or detail statements made by
interviewees. Also to further ensure that the information was as reliable as possible, the option of anonymity was offered early on during the interviews.

The researcher should be mindful of not involve too many subjective decisions, keeping the reader in the dark, thus offering objective results that are replicable (Berg, 2001). In order to address this, the authors made sure to carefully plot our approach carefully as to what area that is investigated and how, with what questions (Berg, 2001).

3.5.1 Generalizability

The aim of qualitative research is seldom focused on generalization of the phenomena to a larger extent. It is more suitable for making sense of the phenomena studied and shedding light on the particularities and peculiarities of the observations and results (Williamson, Burstein, & McKemmish, 2002). The case study approach is also a rarely used method that yields generalizable findings (Baxter & Jack, 2008). When a case study is undertaken it should only fit the group or phenomenon studied but also provide an understanding to similar groups and phenomena; the results from a case study may indeed be generalizable but only to some extent, if the right data collection methods have been applied to the corresponding research questions (Berg, 2001). In this thesis, the authors aim not to make generalised statements of the entire sector, but rather chose the case study perspective in order to determine whether there is collaboration in the Swedish telecom sector, and if so, at which level does it occur and how is that collaboration carried out.
4. Case study - Innovation and cooperation in the telecom sector in Sweden

In this chapter, the results of the study have been compiled in the form of a case study comprising of the following: an overview of the sector, its sectoral patterns and innovative prospects, as well as the results of the interviews regarding the collaboration in the sector and specifically between Ericsson and TeliaSonera.

4.1 Innovation in the Swedish Telecom Sector

Being a very important factor of the growth of the Swedish economy (Edqvist & Henrekson, 2002) the telecommunications sector itself has changed significantly in its growth areas over the years. At first a long era of fixed telephony; subsequently a strong growth in mobile telephony between 1970 and the 2000's; later followed by a leap in data communications; finally the latter two combined into a new growth segment, mobile data communications (Lindmark, Andersson, Bohlin, & Johansson, 2006). The growth in the mobile broadband subscriptions has been "explosive" (PTS, 2012). While broadband subscriptions are exhibiting a saturation pattern, a pattern that could be seen from wired telephony towards mobile telephony (Bacchiocchi, Florio, Gambaro, 2008).

The European markets have been liberalized on initiatives by the European Commission since the 1990's, initiatives to which Sweden has been one of the forerunners (Bacchiocchi, Florio, & Gambaro, 2008).

With the EG initiatives in motion, PTS oversees the deregulation of the telecom sector in Sweden, and is noting falling prices and an intensifying competition between network providers due to the deregulation (Holmberg, 2012; Zettergren Lindqvist, 2005).

Widening the perspective, Ericsson (and TeliaSonera) does not only run their operations and serve their respective customers in Sweden; they supply and serve globally. As a consequence, along comes global competition from near and far.
For Ericsson at the supplier side (i.e. AlcatelLucent, NokiaSiemens Networks, Huawei, ZTE to name a few). As for TeliaSonera, they are competing with the native Tele2, Telenor based in Norway and Hutchinson 3G with its brand name 3.

4.1.1 Sectoral patterns

4.1.1.1 Technological Opportunities

As Figure 7 demonstrates, the telecom sector has entered a new stage of growth, mobile data communications, driving the sector growth. The deregulation has opened up a lot of room for further actors to enter the market, clearly, the entrants see there is value to generate within the sector "many countries have been increasingly deregulated which means that the competition is fierce (...) some of the network providers that were around 10 years ago are not" (E2)

"With the competition having gone global, it has become fiercer, and companies simply have to stay on top and keep on being innovative, whether it regards products or processes or how things are done" (E2)

On the end-consumer side, the deregulation is decreasing costs for users and operators, opening the eyes of even more users (Bacchiocchi et al., 2008).

Many sectors are experimenting with the nature of efficient communication, to improve their operations; the potential is largely untapped, foreboding an intense demand with following immense opportunities for technological innovations (Bacchiocchi et al., 2008). Due to the pervasiveness of the knowledge of the innovations, they are applicable to almost any sector, E1 explains how: "[the telecom sector] can drastically change so many other segments, how do you make business in transport. Take the music industry for example, it has totally changed the concept of how you distribute and sell music. You will see this change in the transport area as well, some physical transports will be replaced by digital transports (...) communication is needed everywhere, that means that our technology can be used in almost any other business in a very innovative way. And I think we've only seen the beginning of this." (E1)

A very recent example of future potential of mobile communications is the healthcare sector (PWC, 2011). According the lines of E2, the possibilities of other sectors tapping into the power of telecom has yet no limit: "Communication is everywhere and can improve everything" (E2)

The sources of innovations are rich as well ranging from “Internal capabilities, universities, international research labs” (E1)

4.1.1.2 Appropriability of Innovations

In order to secure inventions in Sweden, technological companies may turn to the Swedish Patent and Registration Office (PRV) (For more information on patents, please refer to Appendix A). By law, inventions that are new, significantly different from previous inventions, industrially applicable and reproducible, may be patented (SFS 1967:837). While these are more or less standard criteria in most industrialized countries, the PRV together with the political and judicial system in Sweden seem to offer good
conditions in regards to protecting intellectual property. The International Property Rights Index (IPRI) the first international index that attempts a ranking among countries, looking at both physical and intellectual property rights and their protection for economic well-being. According to the index, Sweden shares a second place in regards to intellectual property protection together with Denmark out of the total 130 countries listed (IPRI, 2012). Sweden also provides patents for computer related inventions. While mathematical algorithms by themselves are not patentable, they can be if contained within software coupled with a technological process, running internal systems or control communications signals, in effect including almost any telecom related product (PRV, 2009).

Expanding the gaze beyond the borders of Sweden, where both TeliaSonera and Ericsson also do business, there is the possibility to extend the intellectual property protection. Either by applying direct to the offices of individual countries, or filling out a Patent Cooperation Treaty (PTC) application effectively covering up to 144 nation states (WIPO, PCT Contracting States, 2011). The PCT was constructed and is administered by World Intellectual Property Organization (WIPO) a UN agency with a focus on promoting innovation through an international intellectual property system (WIPO, 2012a). The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) by the World Trade Organization (WTO) also helps guiding international interpretation of intellectual property rights as well as enforcing them, providing a good possibilities for most technological firms to protect their inventions from imitation abroad (WTO, 2012).

As of today, Ericsson has amassed roughly 30000 patents, with an average of 16 new patents per day (Ericsson, Facts & Figures, 2012). In regards to filed PCT applications, Ericsson filed 1116 in 2011, ranking as the 10th most filing company (WIPO, 2012b). TeliaSonera has 440 patent families with a total of approximately 2560 patents (TeliaSonera, Annual Report 2011, 2012). While not all patents result in actual market applications, the numbers are impressive nonetheless. While sources may be rich for Ericsson, the core research at Ericsson is a closed process that keeps information safe.

4.1.1.3 Cumulativeness of sector

The labor market in Sweden promotes long-term relationships between employees and employers in Sweden, furthermore Ericsson, at first shunning expatriating entrepreneur engineers and managers, realized their value and instead started supporting them and providing re-hiring possibilities (Casper & Whitley, 2002).

As mentioned the pervasiveness of the innovations in the telecommunications sector is reaching out to other helping their processes or serving customers within them. These customers then realize new needs that require new, in turn these open further new doors:

“It’s an innovative system, if we put a new network, a new standard capable of ten times the speed of the last one, there will automatically come new ways of using this system.” (E2)
As an example, E2 elaborates:

“I remember when we introduced the first real mobile broadband, the HSPA system, and people were asking, what are you going to do with it, why do you need several MB/s for a mobile device? Very quickly do you see that it’s not only being used; it’s not enough, it generates new services, and then these services put new demand on the network and you need to come up with new solutions.” (E2)

Services such as high definition multimedia streaming gain a new place in the market.

Ericsson naturally accrues revenue from creating and delivering systems that is then re-invested at a relatively high rate into R&D (c.f. Figure 12 in Appendix C). Shortly put the sector is: “A sort of self-generating system.” (E2)

4.1.2 Innovation at Ericsson

Ericsson is a pioneer in its field; since its inception in 1876, innovation has been at the centre of Ericsson’s business (Ericsson, 2012b). When asked about the importance of innovation at Ericsson, the respondents firmly agreed on the extreme prominence of technological and business innovation:

“Innovation is a key strategy at Ericsson. Technology leadership is a top three priority and we spend a considerable amount on R&D, over 3 billion SEK. Such investments are important to a strategic base of staying innovative as a company (...) innovation is indeed key.” (E1)

True to these words, the R&D spending of the last decade has indeed stayed at an average level of around 17% of sales per year, although at somewhat decreasing rate, while yet increasing in absolute amounts since 2004 (c.f. R&D expenditures, Figure 12, Appendix C). When inquired upon what kinds of innovation these investments are directed towards, the answer splits the thought of what an innovation is at Ericsson:

“It is innovation in many areas; it is easy to think about innovations as coming up with new products and services (...) in our line of business it’s also about innovating/reinventing the business model area as there are a lot of changes going on in this sector” (E1)

Business model-innovations seem to be central to Ericsson, which is evident as the manager proceeds by explaining that simply product innovations are not enough:

“You also need to not only innovate in regards to new products and services, you also need to innovate how you develop these services (...) one is constantly challenged in a global competition such as the one in our business” (E1)

E2 further explains in detail that:

“A lot of the innovation is about how we develop products and services; processes, simulators, methods and tools... innovations is not mainly in the products, it's in the way we are doing things.” (E2)
As far as results are concerned it seems to be a winning formula:

“You could definitely say that Ericsson is the leading telecom supplier, globally. We have a significant in mobile communications and there we’re really ahead of the runner up competitor. We are in a leading position both in terms of technology and that of market share.” (E1)

Indeed, Ericsson has a share of 38% in the mobile equipment market (Ericsson, 2012a) and a market share of 10% in telecom services (Ericsson, 2012b), far outpacing the competition in both areas.

4.1.3 Innovation at TeliaSonera

TeliaSonera describe their innovation strategy as a service oriented one:

“We are a telecom operator, we drive for solutions, services and products to our customers. One of our products is for example the "TeliaTelemeeting" technology that we are using as we speak.” (TS1)

As we were hands-on with some of their mentioned technology in the interview, TS1 was further inquired about whether TeliaSonera is an innovative company. The answer resounded a strong emphasis on the importance of the matter:

“it is very important, we see it as one of our core values and key competitive advantages; moving forward (...) it’s not just to 'be innovative', if you look at TeliaSonera’s brand value, it includes innovation and being a pioneering company, so it’s that close to us, at the highest levels.” (TS1)

After explaining the general perspective on the importance of innovations, we inquired for specific cases of innovative activity, 4G was mentioned for the first time:

“If I would start from a technological perspective, we are the first in the world to have launched 4G, and now we also drive services on 4G (...) not to mention we also were first to market with the iPhone.” (TS1)

In fact they did launch the first 4G network not only in Stockholm, but also in Oslo, in December 2009 (Telecoms.com, 2009). TS1 was asked to provide an overlook-concept of their firm and further described their market position as having a wide base, with a customer focus:

“We are also a service provider, building networks (...) we operate services on top of those networks, most of which are acquired technology (...) some technology is created in-house but the value-added is how we actually package these so that it best suits the customer needs. The packaging we do ourselves, but the core components we acquire.” (TS1)

Much like in the old imagery of the PTS report from 1999 (PTS, 1999), TeliaSonera seems to cover much of the model (Figure 1) representing the layers of the telecom sector. With communication technology becoming more mobile and thus less dependent on cables, a lot of traffic is moving away from the existing cables to into wireless signals. Meaning that new technology is being acquired from an actor like Huawei in the case of
the 4G launch in Oslo and Ericsson in the parallel launch in Stockholm (Edenholm, 2010). The arena appears to be an open one. TeliaSonera further elaborates on their approach which focuses on the perspective of their customers:

“We are driving innovation in how people use technology to improve productivity and effectiveness. So we are driving cost leadership and value creation, more than any telecom operator I can mention at this point.” (TS1)

Clearly both players show a tangible proactiveness by staying ahead of competition in technology and significant investments.

4.2 Inter-firm collaboration

4.2.1 Competition and Collaboration - The Operator perspective

4.2.1.1 On Partners

As asked if TeliaSonera had any preferred partners, TS1 explained that size does not matter:

“We have strong partnerships with large players (...) we are also increasingly driving smaller service innovations, with companies that have good ideas, as of lately” (TS1)

Most central were TeliaSonera's customers:

“What we always consider the most critical partners to us are our customers (...) we try to drive innovation together with them, especially with leading players in the B2B market. We also drive "go-to" market operations together with suppliers, one example now on the B2B side in Sweden is a partnership in cloud services” (TS1)

As TS1 put it, they go to market closely with suppliers, the cloud service example being together with Cisco (TeliaSonera & Cisco, 2012). Supplier relationships seem all but static though, as TeliaSonera the last few years have used both Huawei and Ericsson, for their 4G expansions, only to later remove Huawei’s network in Oslo to have Ericsson replace the infrastructure (Edenholm, 2010). It would seem that choice in supplier is interchangeable. The levels of cooperation some vary for TeliaSonera sometimes vary as well:

“We had a deal with Apple that was a simple supplier reseller deal” (TS1)

Procedures for the different types of partnerships seemed to vary for TeliaSonera, as well as being more of a process:

“It depends on the area. We can have just a supplier partnership into the network, that's not much of a partnership as it is a delivery, we might have a budget and something go to market together with (...) it's not so much guidelines as processes, so there are certain processes that we must follow, mandates and principles for the day to day operating rules.” (TS1)
Related to the embeddedness in the sector, the managers were asked whether there is a general cooperation or if everyone is mostly looking out after themselves:

“I think it’s both frankly (…) you have this 4T initiative in the area of mobile payments for example, that requires a certain amount of cooperation. If it adds value for the customers, yes we absolutely do cooperate in that situation. At the same time we are driving for very hard competitiveness for the customer, so it’s not either way (…) the sector is very advanced.” (TS1)

Cooperation with competition did not seem as a strange issue, as the 4T initiative referred to. This unique initiative started in November 2011 consists of the four top service providers in the Swedish market in order to exploit the potential for a mobile payment option, with equal voting rights for all partners (Hibberd, 2012). It will be launched under the brand name WyWallet during summer 2012 covering 97% of Sweden's mobile customers (WyWallet, 2012). The initiative challenges the position of banks in regard to consumer transactions, an ecosystem that 4T CEO Johan Ragnevad finds "rather stagnant" (Hibberd, 2012).

4.2.1.2 On Customers

TS1 provided a point of view on TeliaSonera's collaboration with customers:

“Our suppliers work much closer with us today, I believe all suppliers are realizing the value of the customer (…) we as well always work together with our customers. You as an end-user, you don’t want services that only work with one operator, like the electronic wallet for example, if you want to make payments, you want your services to work with not only one operator, if you change your operator or if your friend has another operator, you still would like to share the same services (…) you want interoperability between operators. This is tricky of course, because if you’re an operator you want something, which is unique for you as an operator

The mind-set explains the reasoning behind initiatives such as 4T, getting together with competitors to provide better value for end customers with everyone winning.

4.2.2 Competition and Collaboration - The Supplier perspective

4.2.2.1 On Partners

Similar to that of TeliaSonera, the choice in partner was a fluid one:

“It's really changing quite rapidly, who is the leader, who is the leading operator or who is the leading competitor and so on.” (E3)

The market is changing tremendously making the roster of competitors to collaborate with very shifting:

“Many companies have restructured like Nokia and Siemens (…) it is always a moving target; yes you have strategic partners when you introduce new technology but with whom is changing all the time, so that’s why you need networks. Some of the network providers that were around 10 years ago aren’t anymore” (E2).
Collaboration between competitors has its lifecycle as well though:

“*When you have the standard, it's really into competition again.*” (E2)

As one might have expected, the telecom suppliers do start competing at some point. E2, further queried on reasons behind collaboration, named the success factors of previous standards:

“If you look at for example with the first digital systems with GSM, why has that spread, why is that standard so successful? Because it's really a global standard dominating in the world today with a number of subscribers. That's because you actually built the ecosystems, you provided an open standard, so many manufacturers of devices, cell phones or modems, were able to build and compete in the market.” (E2)

At the current stage of things, Ericsson did not seem to like to tie itself with a specific partner on the vertical side:

“I think anyone that wants to be a technology leader is interesting. If you look at earlier generations there have been other operators that were the first one (...) early adopters are important, and it's important for us because we need to get the technology into the market. We put a lot of money into intense R&D for a number of years and then you really need the standard to go into the market of course.” (E2)

Thus, speed to market would appear to be a quite important factor. Nevertheless, Ericsson has had a history of working together with TeliaSonera that does seem to carry weight:

“On the other hand I think TeliaSonera and Ericsson have a long history of working together so it works very smooth when we do it.” (E2)

E2 at Ericsson explained the situation in their network, how value can be created:

“It’s quite a big cooperation within between different actors in the market (...) if you look for example at the mobile broadband systems, you start with research very early together with universities but also together with your future competitors” (E2)

Similar to TeliaSonera, competitor collaboration seems to be a reality for a telecom equipment supplier like Ericsson as well. The reason was quite rational:

“Because then you can agree on where will technology be in a couple of years, we set a standard so that it later really is the most competitive and advanced technology being used (...) that's the way it was done when we did the GSM (2G) standard, the 3G standard and the LTE standard (...) you dare to go very far when it comes to technology.” (E2)

After making the workings of the ecosystems with competitors and other actors explicit, E2 was further inquired on whether practice was a local one:
“This is not only a Swedish phenomenon, this is global. I think the reason is that the competition is very, very strong. If Ericsson wouldn't innovate every day we would be left behind, so that's our way of competing and if you look at the products that we put on the market, they're constantly renewed. You can never relax; it's a global competition.

But it is not only the supplier side driving the innovation; E2 explained the further outskirts of the ecosystem:

“It's an innovative system, if we put a new network, a new standard capable of 10x the speed of the last one, there will automatically come new ways of using this system. I remember when we introduced the first real mobile broadband, the HSPA system, and people were asking, what are you going to do with it, why do you need several MB/s for a mobile device? Very quickly do you see that it's not only being used; it's not enough, it generates new services, and then these services put new demand on the network and you need to come up with new solutions.”(E2)

Probed in regards to Ericsson's efforts in promoting and fostering innovation within their ecosystem, E2 explains:

“Many companies in our business, had standards of their own, company-unique standards that weren't open. What we at Ericsson have been driving is to build the ecosystem we see today, that is open for everyone, so anyone can have that information, whereas in other businesses some companies are keeping their standards to themselves and not letting everybody in (...) standardization and making those standards available for others is key to build ecosystems.”(E2)

Indeed, Ericsson as a market leader has had a role in more than a dozen standardization organizations (Ericsson, 2012b). Ericsson also takes part in multi-firm projects:

“And there are also arenas where you meet and innovate on this. One of these arenas is for example the Royal Seaport Project, or Norra Djurgårdsstaden in Stockholm. That's where Stockholm's city put requirements: lets' see how you can do a part of the city that will be carbon dioxide neutral in 20 years' time (...) All of a sudden you have all these companies working together with academia to see, how can you do this?” (E2)

E3 adds why projects like these are important:

“So, it's not only how we work together with other players in our own industry, we now are doing much more interactions with other industries as well, to create this ecosystem. Consider more than 50 billion devices being connected, or basically that benefits from being connected being connected. Then we really have to work much more cross-industry-segments to make that happen.” (E3)

E2 revisits the old paradigm with yet another correction, the chain is spreading further out from the telecom sector itself:

“You work not linear any more, you really are working across different segments; it's not only for Ericsson to work with other telecom suppliers or device manufacturers, it's also to start
interfacing with other industry segments like the transport sector, the car industry, electricity grid companies we sort of show them how can they use our technology to do their things in another way” (E2)

When it comes to the end users regardless of sector, and whether Ericsson mainly looks at their direct customers or their end customers, E2 explains:

“It's both, you must look at both, the ones, and the most important customers when it comes to contracts are operators. But we need to think about the operator's customers as people, or companies as well. Because otherwise, you won't be making a good system (...) you really need to think about the customer's customers to be a really good inventor or innovator (...) we are looking very, very much into how is technology being used.

E2 also adds regarding competition and collaboration:

“But it’s also us and other vendors that are maybe sometimes pushing for new technology because we want to stay competitive. If we set the new standard, you really want to be sure that is the standard that can compete with everyone. Because all the time you will be challenged by new players, coming into this area, trying to set their own sort of technology on the map. If you make a global and open standard, the challenge is that that global and open standard cannot be un-modern; it needs to really be the best of the best, because otherwise you get competition again. So we as vendors of telecom equipment are the one driving the standard forward I would say, but we do it in close cooperation with the operators.”(E2)

4.2.2.2 On Customers

Regarding the end customer side, Ericsson's values seemed similar to those of TeliaSonera, with an end-customer aware philosophy:

“Today you are more aware of the power of the end users I mean if you go really long back you could say that 100 years ago you had telecom companies, where you could only call people in the same telecom company because you shared the wires (...) pretty soon you realized that this is not good business. If we make switches and everybody can reach everyone, through different networks, that’s probably better for everyone. (E2)

Their direct customers are naturally valued as well in terms of providing value:

“They are the ones interfacing the end-customers, as people or companies as customers. So they have a much more, they have a better picture of what is needed, what kind of services are needed. And if those services are needed, what kinds of requirements will that put on the network.”

4.2.3 The Value chain

Both Ericsson and TeliaSonera were in agreement regarding the state of the model PTS (1999) report, that it was outdated and in no way represented the market as of today:
“It is not linear in any way it’s very much about building different kinds of partnerships and ecosystems around communications, so you need to be innovative in your sort of business interfaces.” (E2)

TS1, corroborating the latter said the following about the 1999 framework:

“I don’t think this picture holds true at all today. TeliaSonera also drives innovation together with customers (…) you can hardly be a customer oriented company if you’re not listening to your customers. If we had to take a role in it would be in this frame (marking the levels Service Provider, Network provider) high class network, high class service provider” (TS1)

Prompting E1 on remedying the picture, he went on to explain how Ericsson perceives their reality:

“If you look at the network side it is a very long process, it’s not linear but very parallel, going over a couple of years. In parallel with that of course you have building the ecosystem.” (E1)

About creating new network standards E2 said:

“It’s something we do together. We have close cooperation with our customers when we make new standards, when we innovate. So it’s not an all linear way, there are a lot of discussions and work parallel when you set the standard with our customers, the operators.” (E2)

Ericsson’s roots in the value chain extend even further than the imagery represents, as an infrastructure provider:

“The research organization is roughly 600-700 people distributed around the world doing research. Their responsibility is interfacing the universities and institutes around the world that Ericsson cooperates with.” (E2)

4.3 The fourth generation of Networks

4G, short for fourth-generation wireless communication systems, that enables new speeds of up to 80 Mb/s in Sweden (Telia, 2012) There are different 4G standards, the one referred to in this thesis, is the Long Term Evolution standard (LTE) developed by the 3rd Generation Partnership Project (3GPP) which in turn consists of several members in the form of companies, administrations and regulatory bodies (3GPP, 2012).

“If you look at 4G, we do this pre-standardization cooperation with other companies also competitors and with universities where we do research to find out the technology that’s going to be up to date in a couple of years. And then you go in to the standardization phase I was talking about before.” (E2)”

E2 further added regarding the standardization process:

“It’s also important to work together with regulators regarding the radio spectrum (…) what we need to do there and what we have done, is we have tried to work with more international standardization bodies and regulators to make sure that the same radio spectrum is available
globally so that you can move and take your device from one country to another and it works there as well. You need also to be a technology leader in your development environment, not only in the product.” (E2)

4.3.1 Supplier-Operator Collaboration

TeliaSonera sought out to become the first operator in the world to offer 4G services in 2008. TS2 describes how the cooperation with Ericsson came to be:

“At TeliaSonera we really achieved our goals with this cooperation I would say. With what we set out to do; being the first in the world to launch a 4G service.” (TS2)

Just as Ericsson wanted to have early adopters for their technology, TeliaSonera was looking for a supplier to provide a fully functional 4G system as quick as possible. Accordingly the fit between TeliaSonera and Ericsson seemed to be quite a good one as Ericsson was also looking for some party that wanted to be innovative and quick to diffuse innovations:

“It's important for us to have leading customers, customers that early want to compete with others, and it's important for us that we get the technology deployed quickly so you can test it and develop it further. It's very important that you get early adopters like TeliaSonera was on 4G to get products out and production started, and you start to deliver. That's how you make money.”(E2)

Early on, TeliaSonera entered in a selection stage where they have begun talks and negotiations with three companies that held the technology for 4G at that time:

“Well, we invited the main suppliers and I would say they are three, Ericsson Huawei and NokiaSiemens Networks (NSN). At that time NSN made clear that they couldn’t meet the timeline that we saw, but the other two said they could.” (TS2).

TeliaSonera later settled for Ericsson for the following reasons:

“We have had a close dialogue and a close strategic discussion together with Ericsson since before. Therefore it was quite natural to continue that dialogue.” (TS2).

But according to Ericsson, the collaboration with TeliaSonera started much earlier than 2008. When asked about which point in the project their customers (network operators) were involved, E2 replied:

“Those were involved long before the standard was set, in a forum called Next Generation Mobile Network (NGMN). The operators formed that to really have an influence on how the standard is going to look like. So a lot of interaction with operators happened, even before the standard. Then you have a lot of interaction with the operators during the development, to understand their needs; what they're trying to do (...) a close innovation with our customers, all the time.” (E2)
According to E3, it was a joint effort. Where operators think in terms of network capacity and capabilities (i.e. cost of operation, ease to deploy etc.), with that, operators “can contribute with a lot of specifications and important parameters that need to be looked at.” (E3)

### 4.3.2 Nature of the relationship

During the pre-stages and launch of 4G in Sweden, the collaboration between TeliaSonera and Ericsson was more of a contractual natural rather than a strategic alliance for example. However, both parties stress on the fact that it was a closer bond than a simple supplier-customer relation:

“In the end it’s always a contractual one, because it was a component of a commercial contract to buy certain equipment. But at the same time it was not like a normal procurement of equipment, because there were quite a lot of unknown things, therefore we had to form this more on a strategic level and take it step by step and not to 'buy from the shelf.” (T2)

T2 further adds regarding the embeddedness of the collaboration and how the game was still open for other suppliers:

“You could say it was a loose or a strong one, if they didn’t meet the requirement we would swap them out. As the first contract was only for the launch network which was 300 base stations or so. Then of course we made the contract for the rest of the network. Of course we got the knowledge from the launch project but it was a pure commercial evaluation then, which luckily for Ericsson ended up with that they should continue, but we also took in NSN at that point because they were then they were ready to have production for 4G as well.”(T2)

So it would seem to be a close collaboration, but far from chained. From Ericsson’s point of view, the closeness in the collaboration was necessary:

“That's the interesting thing, when you put something like a new standard into the market, you really do it together. I mean it's really a partnership in making that happen, so you support each other to make the best out of it. Because you will have a lot of challenges, introducing new technology is always very difficult. So if you have a good relationship, a good partnership in this, that's the best.” (E2)

Having a solely contractual deal did not seem as a sensible option to Ericsson:

“You have to really make a joint venture. That's when it works the best, when you have this kind of joint challenge and joint operation to get it running.”(E2)

### 4.3.3 Knowledge transfer

Both the supplier and the customer were inquired on the quality of knowledge transfer in their different interactions:

“There were probably things they didn’t share with us but in general I would say we were very deep into the knowledge of where Ericsson were in the processes or if they had any problems along the way.”(TS2)
There are some parts in our products which are unique, which are our way of competing, that we don’t disclose. And you don’t need to do that, because that is sort of under the interface, it’s something that you can do to make your product faster or with less delays and better quality (... that’s your competitive advantage. (E3)

As one could perhaps expect, the reason is to sustain competitive advantage, as E2 further justify their choice of not disclosing all the details due to the fact that:

“[TeliaSonera] are also talking to our competitors, so we cannot give away everything to them. I think you can be pretty open with them, but when it comes to these unique technologies it’s really up to us to make that work.” (E2)

The 4G launch had another party involved, producing the interfaces (USB-dongles)

“The third one was Samsung, the terminal vendor (...) the success of the whole story was making sure that we had a very strong connection between all of us, that we sit in the same room with a very open attitude discuss the issues that we had and then solving them together. We would never have managed to meet the timeline otherwise if we hadn’t done that. One cannot forget that sometimes you really need a third party in that strategic work as well. (TS2)

It would seem that physical meetings were key in transferring knowledge in a successful way. As his picture regarding complexity of the 4G launch in Sweden broadens a bit, TS2 was further asked to elaborate on the information flow:

“The whole idea was that there shouldn’t be any restrictions really. Ericsson should come to the table and present any problems that they had and Samsung should do the same. I would say we came as close as you can get in that.” (TS2)

4.3.4 Post-launch of network

TS2 made clear that the launch project was a part of the greater deployment in Sweden: "it was the start of the 4G rollout; we had to get our normal processes or adapted processes into place to then continue after this launch. Because the launch was just a very small part of the whole 4G project. (TS2)

A second phase was initiated after the launch:

“Right after the launch project we made a new procurement round where we evaluated who should be the supplier for the full-scale rollout in Sweden. It could very well have been the case that the Ericsson base stations were not good enough or too expensive then we would have replaced them.”(TS2)

The project was not any different from their previous:

“That was also part of the constructing process that if at any part during the project we felt that we would not be the first in the world to launch, we would have had the opportunity also to change the base stations already for the launch project.” (TS2)
As for benefitting from exchange during the stages prior to the rollout:

“If they wouldn't have run it together with us I think they would have been in a much worse situation, because they had to do some very drastic re-designs as a consequence of our project. We definitely made the product work a lot better and we also made the assessment of the whole development process in Ericsson.” (TS2)

TS2 seemed confident that their input made processes better at Ericsson, as for the assessment he explained: “We requested an external audit of the development process because there were some mistakes found in the system? And we wanted to know how they could be there and why some things failed. Based on that audit, Ericsson has actually changed a lot in the whole development process and gotten a much better outcome of the project.” (TS2)

4.3.5 Pitfalls

As a customer to Ericsson, TS2 was asked how things could have been done better during the 4G cooperation: “I think we sort of fixed those eventually but of course there were pitfalls on the way; we started off with one dialogue with Samsung and one dialogue with Ericsson. Ericsson blamed Samsung and Samsung blamed Ericsson, which is why we later decided to sit in the same room all the time instead” (TS2)

The close physical meetings seemed to be suitable for starting bringing up other issues that were appearing early on:

“When you're in a hectic development stage and trial phase more or less, then sometimes you think you have a problem but you're not sure, do you tell that you have a problem or wait until you know you have a problem?” (TS2)

“There was this sort of mismatch of our clear demands on what are the prioritized functionalities that need to be there at launch and what the development guys were doing. That came back in the process audit we made as well, because we had our priorities but someone in development decided to down-prioritize some things that that were high on our priority list. That decision was not visible to the guys sitting together with us, until very late.” (TS2)

The general problems seemed to relate to assess whether some problems were worth bringing up, or whether they were a problem at all:

“I think in some instances we put the border on the right side and sometimes on the wrong side, that people waited too long to inform that 'now we have a problem and how can we solve that'. There were some technical limitations in both the terminals and the network and I would say that all three of us had good knowledge of where we were in this.” (TS2)

“There is never enough collaboration, Ericsson does more than they used to, but it can be more. Ericsson has a positive outlook on external collaboration. The innovation is carried out in separate departments, main collaboration is more prevalent on Research than on Development. Because on the development we close up a bit, to keep the core technologies protected. The “actual” collaboration occurs within the customer/ sales units.” (E3)
The Swedish telecom sector benefits from above adequate conditions that not only offer a suitable environment for innovative companies, but also foster innovation. Deregulation and globalization has expanded the arena of telecommunications in Sweden and elsewhere. International competitors abound as innovation and speed to market becomes increasingly important. As can be seen in the sectoral patterns and characteristics, the Swedish setting provides interesting grounds for innovation and consequently a special setting regarding knowledge transfer between firms within telecommunications.

5.1 Sectoral patterns

5.1.1 Technological opportunities

With a new direction in technological growth there are new opportunities that come with them. As mentioned in both the interviews and in publications, Sweden among other countries has been seeing deregulation lately, with room for more to come. So far, the deregulation has increased competition in the sector but also enabled further possibilities for more actors to pursue opportunities and generate value (R).

The pervasiveness of the knowledge in telecom sector is substantial. As one the Ericsson managers state, the applicability of their solutions go far: “Communication is everywhere and can improve everything” (E2). While the other adds: “our technology can be used in almost any other business in a very innovative way (...) I think we've only seen the beginning of this” (E1).

5.1.2 Appropriability of innovations

The possibility to avoid imitation and secure profits from inventions (thus making them innovations) in the telecom sector is good, especially in Sweden but also in other markets. The means of appropriability Patents are useful as they are a guarantee for 20 years of protection which is far longer than the life cycle of most technological innovations. Coupled with the intellectual property climate in Sweden, international intellectual property protection is a PCT application away and breaches abroad enforced

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1 Properties of the knowledge base have to deal with firm level characteristics that can be derived from the collaborative efforts, and are thus discussed in section 5.2.3
by the WTO making international extension a relatively uncomplicated path in regards to most developed countries. Considering the amount of patents granted by both companies but in particular Ericsson as a technological innovator and supplier; the level of appropriability from patenting appear good.

Prior to patenting, Ericsson also make sure that core technology research and development is kept in-house and thus secret, as apparent from the interviews and the organizational chart (Figure 11, Appendix C).

Both companies also speak of having the strategy of simply staying innovative, E2 stating: “Innovation is a key strategy at Ericsson. Technology leadership is a top three priority and we spend a considerable amount on R&D” (E2). With these means and high levels of appropriability, Ericsson has excellent incentives to innovate.

While TeliaSonera does not directly need superb levels and means of appropriability themselves as much as Ericsson, they do benefit from it as Ericsson find it more worthwhile to develop products that TeliaSonera may in turn use to deliver value to their own customers.

5.1.3 Cumulativeness of sector

The fact that Ericsson realized the value in their venture hungry employees demonstrates the weight of human capital; how competence accumulates in this sector. The innovations generated at Ericsson generates new businesses and new demand. A cycle that generate new SMEs with new services or improved existing services with increased demand. Also, the long term relationship promotion by the Swedish labour market enables accumulating effects for the human capital in firms.

The cumulative effect is well reflected in “the self-generating system” E2 speaks of. The high R&D investments made by Ericsson create new capabilities, opening new doors for services that can benefit from increased performance. Ericsson has cultivated a long history for technological innovation that has contributed to its current position in the market. As a leading infrastructure provider in networks, they have had products across all concurrent industry standards, which has led them to improve their learning curve throughout the innovation process, and benefit from knowledge accumulation they have amassed through the patenting and inventing activities.

5.2 Inter-firm collaboration

5.2.1 Incentives to cooperate

TeliaSonera wanted to gain competitive advantage by becoming the first network operator to offer 4G services worldwide and in Sweden in particular. Therefore they had to acquire that technology first, however, in 2008, the standard was ready, but the product was not finalized, and not ‘roll-out’ ready. They coupled up with Ericsson who was in possession of the standard at the time, and was able to develop a customized
product in due of time. From Ericsson’s perspective, they needed the means to diffuse their innovation. Both companies desired a **first mover advantage** which will later on gain them a competitive advantage in the market. As the product was not yet ready, and under the stress of an approaching deadline, both companies saw the need to cooperate more closely in this case in order for the project to be successful.

“To be successful, innovating organizations must form linkages, upstream and downstream, lateral and horizontal” (Teece, 1990, p. 22).

In this collaborative case, the core technology producer is collaborating with the distributor and service providers in their immediate network (Teece, 1990). Ericsson have understood that in order for their new technology to be successful they need an ambitious partner that is enthusiastic and ready to take their product to the market. TeliaSonera describe this collaboration to having a successful outcome, meaning that the innovative product has been successfully developed and installed.

Another collaborative aspect in this case is the fact that the fourth generation of networks wasn’t the product of an overnight process; it has come through an intricate process of continuous meetings and research agreements with the entire telecommunications industry actors. The standardization process aimed to create the LTE industry standard in order for the ecosystem to learn and be able to develop compatible solutions. Failing to do so will result in discrepancies in the technology compatibility leading to several networks not being able to connect to each other, which at the end is the worst outcome for companies whose sole business is to connect and network. The notion of **ecosystem** is extremely important to Ericsson, as they view it as a key successful strategy for innovative products of which the usage spans across the entire network: “The first digital systems (GSM), it’s really a global standard dominating in the world today with a number of subscribers. That’s because you actually built the ecosystems, you provided an open standard, so many manufacturers of devices, cell phones or modems, were able to build and compete in the market.” (E2)

### 5.2.2 Level of cooperation

#### 5.2.2.1 Network Collaboration

Both levels of cooperation are present in the Telecom sector; one is more present than the other, which is **vertical integration**. In the case of the 4G network development and roll out, it was a classical **supplier-customer** deal. The other level which is less prominent but equally important is the **horizontal integration**. When all the actors in the network come together including competitors for the standardization process, they do collaborate vertically and horizontally. The 4T initiative between Swedish telecom operators for the purpose of creating an online payment system is also considered a horizontal cooperation, as it happened between competitors in order to bring about a new innovation (WyWallet). In both of these illustrations, the incentive to collaborate was mutually shared by all the participants: coming up with a unified innovation that will
be successful in the market. Competition is essential for a healthy network dynamic as it creates incentives and opportunities for firms to innovate and compete with each other (Teece, 1990).

Ahuja’s argument clearly indicated that companies who hold multiple indirect ties are more likely to innovate more effectively and efficiently than companies who have a few direct relationships within their network (2000). This argument holds true to some extent in the case of the Swedish telecom sector. **Indirect ties** are wildly used in this sector, as Ericsson for example conducts research and development activities with a large number of universities, institutes and companies around the world through its research organization. In addition, Ericsson does not exclusively tie itself with one specific network operator, simply because it will not be efficient for them, as no single network operator spans across the entire market, and will therefore cost Ericsson business and market share. TeliaSonera as well does not have any exclusive or preferred partners; they have précised that they do not want to limit themselves to a single infrastructure supplier because they will not benefit from competition between the technology providers.

However, partnerships, albeit **lose and contractual**, still exist in this sector. The importance of cooperation and collaboration in this sector is undeniable, all interviewees vouch for the necessity of collaborating with the network constituents both near and far. Although none of the two companies interviewed wants to limit itself to having one single partner, because it might deter other prospective customers/partners is a negation to their favoring of collaboration. Both Ericsson and TeliaSonera seem to have found a middle ground where they will not give up on their competitiveness in favor of collaborative efforts, while still benefiting from the advantages of collaboration on innovativeness and competitive advantage. By opting for such loosely knit collaborations with their suppliers and customers, TeliaSonera and Ericsson have chosen a ‘one time’ type of deal that allows them to secure the deployment of their new service and the diffusion of their innovation respectively without having to accrue the costs of maintaining a long term partnership (Ahuja, 2000).

**5.2.2.2 Stages of collaboration in the innovation process**

Two cooperative efforts have come into play in the creation, deployment and roll-out of the fourth generation of networks. The first cooperation took part in the early idea and research stages, where the standardization process occurred and has led to the creation of an industry standard. The first collaboration was a mutual effort of technology producers, network operators, institutions, universities and various research organizations involved in the international telecom industry. The second collaboration took part between TeliaSonera and Ericsson in the late research stages, where the two companies held meetings in order to organize and shape the collaboration.

Ericsson’s innovation process follows the **departmental stage** model presented by Saren (1984), with a few distinctions. The research and development department at Ericsson is actually separated (c.f., Figure 11, Appendix C). The entire research for all
Ericsson divisions is being carried out in the Research organization. While the development is taken care of in the respective business units (i.e. multimedia, global services, CDMA mobile systems and Networks). This allows for a centralized research effort which allows for a deeper cooperation with research bodies (e.g. universities, institutions or other companies). This separation is the result of the restructuring of the company in the beginning of the last decade, and it was meant to bring about changes that improve the innovation efforts by streamlining research and focusing the development on specialized business units. The rest of the process, engineering, design production etc. takes place within the business unit and through a close network of suppliers and manufacturers.

Figure 8 depicts the journey of the 4G network from inception to the final product through the newly revised value chain. The process starts with the 3GPP standardization process that regroups all actors in the industry in a joint effort to produce the next industry standard. After the standard has been decided upon, Ericsson research begins drafting the new product (LTE). In 2008, TeliaSonera expressed its interest to become the first to purchase the 4G network and began evaluating the pre-existing 4G networks, after which they chose Ericsson’s proposition. Then the actual collaboration began between Ericsson, TeliaSonera and Samsung. A series of meetings were conducted in the research stage to determine the specificities of the future network, in terms of capacity, location and technicalities. The involvement of TeliaSonera was much higher in the research stage than in the development step, Ericsson’s justification to this semi-inaccessibility to the fact that they needed to protect their technological core competence by divulging fewer details as possible, since TeliaSonera was still talking with other possible manufacturers and competitors. The following steps were done in house, within the Network Business Unit at Ericsson, and TeliaSonera were kept informed in regards to the advancement of the project. In the final stages, TeliaSonera was fully included and the final stages were performed in unison (marketing, roll-out). Throughout the entire process, Ericsson Regions, the unit responsible for customer services has been in contact with TeliaSonera in order to provide assistance and maintenance services.

Hagedoorn (1993) advocates that in technologically intricate environments, suppliers ought to involve their customers in the entire process. Not only should they be kept informed of the improvements or setbacks, the customers should be able to provide their feedback in regards to the product itself. TeliaSonera is the link between Ericsson and the final user base of their networks, and they have an understanding of what the final customers need and want. Therefore Ericsson should have involved TeliaSonera further in the middle stages, in order to avoid some of the pitfalls mentioned by TS2. Further sections will discuss how this involvement might have taken form.

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2 Samsung was not included in the value chain representation as it was a not part of the development of the 4G within Ericsson, but were providing additional services to TeliaSonera as a terminal vendor.
Figure 8: Revised value chain - Creation, production and distribution of the 4G network
5.2.3 Knowledge transfer

In the case of the collaboration between TeliaSonera and Ericsson, the knowledge management aspect of the cooperation has been highlighted by the interviewees (especially on TeliaSonera’s side) as having played an important in ensuring the success of the product, albeit for some setbacks.

Knowledge was transferred by the means of continuous contact between the two companies in the form of meetings and constant communication between the two parties. Two general mistakes were made in the beginning; the first one was that the meetings with Ericsson and Samsung were conducted separately by the customer. According to TeliaSonera, this has led to several problems including delaying the entire process as the meetings were taking up more time separately than they would have had they been combined. The other issue is that the different actors in this partnership could not have benefited fully from the collaboration had they not been in the same room (according to TS2, who was part of the entire collaboration process and helped coordinate the meetings as well as represent TeliaSonera in the negotiations).

Tacit and private knowledge was not shared by Ericsson during the meetings because the people present at the meetings were also negotiating with Ericsson’s competitors at the same time (Huawei and NSN). They (Ericsson) have kept the their core technology a secret as to maintain their competitive advantage. In the case of a customer-supplier relationship, knowledge is dispersed across two or more partners, as both companies are likely to share their information with their sub-suppliers and other partners that are part of the production network (Fagerström & Olsson, 2002). It is understandable that Ericsson would want to protect their most valued information. When transferring valuable and scarce knowledge it might not always elicit positive attitudes among members of an organization. Sharing, however, can sometimes be a necessity in developing and enhancing one’s own knowledge in order to contribute to collective objectives, especially in the case of a technology based collaboration such as the one at hand (Johnson, 2005; Hackney, Desouza, & Loebbecke, 2005).

There were also cases when information was not relied to the customer simply because of lack of judgment from the development team: “When you’re in a hectic development stage and trial phase more or less, then sometimes you think you have a problem but you’re not sure, do you tell that you have a problem or wait until you know you have a problem?” (TS2). In this case, the development team exercised bad judgment and did not accord the same priority order as TeliaSonera: “There was this sort of mismatch of our clear demands on what are the prioritized functionalities that need to be there at launch and what the development guys were doing. We had our priorities but someone in development decided to down-prioritize some things that that were high on our priority list.” (TS2). Had TeliaSonera been more involved in the development process, they would have had the chance to remedy to that problem. However, because of Ericsson’s policy to protect their competitive edge, this was not possible.
Shortcomings in knowledge transfer in this particular collaboration can be explained with the level of embeddedness between the collaborators.

### 5.2.4 Embeddedness

The nature of the collaboration between Ericsson and TeliaSonera has been under a contractual agreement between the supplier of technology and the customer who is going to diffuse the technology, which, according to Narula and Hagedoorn (1999), is somewhat in the middle between interdependency and independence. This relationship exceeds that of a customer-supplier in that both companies need each other’s contribution in order to fulfill their strategic goals. Ericsson needs to diffuse its technology and bring it to market, and TeliaSonera needs to satisfy its customers’ needs and gain a competitive edge in the market by introducing an innovative solution. While neither Ericsson nor TeliaSonera possess all the components necessary to perform all the steps of the innovation and diffusion process in-house, therefore the need to collaborate arises. This collaboration has been carried out successfully, as the product has been rolled-out within the time frame set beforehand and both companies seem to be satisfied with the outcomes of the cooperation.

Adequate selection criteria have been used to determine the right partner for the 4G project. Both companies seem to think that they are right for each other in terms of goal and vision alignment as well as adequacy in terms of production quality since TeliaSonera requested and performed an external audit. However, it seems that the lower level of relational embeddedness within this relationship might have hindered the full potential of the collaboration (Uzzi & Lancaster, 2003). Ericsson’s reservations towards divulging their core technologies by not including TeliaSonera in the development stage are a result of the high independence in the customer-supplier relationship.

An additional reason for a more embedded relationship, is to reduce the risks of a lose contractual agreement (e.g. discrepancies in knowledge transfer, lower quality products, increased costs to customer services etc.), and benefit from the advantages of a closely embedded relationship (Khanna, Gulati, & Nohria, 1998).

Choosing the right kind of relationship is key in better benefitting from the knowledge transfer, and its subsequent learning outcomes (Das & Teng, 2001). A suggestion could be to hold a partnership for a limited period of time that spans the development, deployment and maintenance of one generation of networks for example. A step upwards in Narula and Hagedoorn’s (Figure 5) organizational spectrum towards more interdependency suggests that a joint R&D type of relationship is more adequate in this case (1999). In that way, Ericsson and TeliaSonera can work much more closely together under a regulated and well organized partnership, in terms of governance, visions and goals and an improved knowledge transfer. While still respecting their decision to not be locked in a single partnership as that might hinder their competitive efforts in other countries. For that reason, the partnership should be limited to Sweden. As mentioned in the beginning of this analysis, Sweden benefits from an above average innovative
environment, that not only ensures innovative companies an adequate level of protection technology appropriability, but also fosters innovation in this particular sector. Henceforth, it is what some would call the ‘perfect’ environment for technological innovative activity (Chilver, 1991). In addition, Ericsson needs to ensure that it holds a significant amount of market share in Sweden, as it is its home turf after all.

The standardization process, during which every network solution must adhere to in order for the industry standard to be compatible with the rest of the ecosystem’s innovations and vice versa, already provides a collaborative opportunity for both Ericsson and TeliaSonera. By prolonging the collaboration to the later research and development stages of the innovation process, they could each benefit from this in the following way (Elmuti & Kathawala, 2001):

- Growing and gaining entry to new markets, or to existing markets in this case;
- Gaining access to new technology earlier and at a lesser cost than that of competitors: TeliaSonera will have the first pick when it comes to innovations in network technologies;
- Sharing R&D costs and diversifying risk in regards to finances
- Securing a competitive advantage: first mover advantage, speed to market advantage, and a wholesome technological innovation.

In the case of a technology oriented strategic alliance, the appropriability of innovation can be improved on significantly as companies can benefit from each other’s technological advances without infringing on patents or intellectual property rights, and henceforth improving the technological innovation (Narula & Hagedoorn, 1999; Breschi et al., 2000). This aspect will improve the learning between the two companies tremendously, as TeliaSonera will benefit from Ericsson’s technical knowledge (provided they share it under the new agreement), and Ericsson will benefit from TeliaSonera’s wholesome knowledge of the final customers’ needs and wants, as well as improve its own customer services.
6. Conclusions

This chapter aims at summarizing the findings, and bringing closure to the study. The purpose and research questions are fulfilled and the findings discussed. Further research is also suggested along with implications to businesses. Finally, the method and research approach are criticised.

6.1 Conclusion

The purpose of this thesis is to explore the dynamics of innovation within the telecom sector in Sweden, and determine the level of cooperation within the telecom sector, in terms of the flows of information and embeddedness. In order to fulfil this purpose, three research questions have been devised, and the corresponding data has been collected by means of a case study, and analysed through the contrast and reflection using the theoretical background as a framework.

RQ1: What are the innovation dynamics that characterize the Swedish telecom sector?

The Swedish telecommunications sector satisfies all the characteristics of a highly innovative, technologically specific environment that allows for innovation dynamics to take place. The technological opportunities are rich as the knowledge can be applicable to a wide range of markets, while the appropriability, i.e. the ability to accrue profits from the products released to any of these markets is superb. Both the knowledge and technology is of a cumulative nature, each factor further improving itself, generating new opportunities to capture and deliver value. A sector with such characteristics provides an interesting breeding ground, innovation is bound to repeat itself and intensify even further. In this environment, extraordinary bonds are bound to take place between actors.

RQ2: Is collaboration existent in this sector and to what extent (information flows, embeddedness)?

Collaboration appears in every aspect of the Swedish telecom sectors. All levels of the collaboration are present (i.e. vertical and horizontal). On a general level, the actors in this sector in general seem to understand the importance of collaborative and cooperative efforts within the ecosystem, as it is apparent in the standardization process that is performed worldwide, and in the 4T initiative that groups the Swedish telecom operators. This collaborative spirit is heightened in the case of the 4G network development and roll-out between Ericsson and TeliaSonera.

RQ3: How is collaboration then carried out in such a complex environment between Ericsson and TeliaSonera?

The relationship between the technological innovator and the technology diffuser shows the span from mind to market as the collaboration extends from the product idea (standardization process) until the product deployment. The level of embeddedness was typical of a customer-supplier contract, which has allowed for the success of the project as a whole, as both parties were heavily invested in the collaboration, in terms of financial commitment and importance of the innovation. However, the low involvement of TeliaSonera in the development stage has led to discrepancies in the knowledge transfer and that is mainly a product of the low level of embeddedness.
6.2 Discussion

The high levels of intensifying competition, increasing deregulation and technological advances, make innovation and speed to market even more important. Innovative companies within the Swedish telecom sector have to deal with all of these external elements in order to remain successful, retain their market share, and conquer new horizons. One way to do so, and that this thesis has delved upon, is inter-firm cooperation aiming at innovative activities. This is already wildly practiced in the sector of interest on a global level, however, the characteristics of the Swedish telecommunications sector permit for an even deeper and closer cooperation between the inter-firm network.

Ericsson and TeliaSonera, being the largest players in this sector, have taken the lead in exemplifying this cooperativeness, albeit with some pitfalls. Suggestions to improve the cooperation include coupling. Considering that one of the means of appropriability for both actors include the simple speed of innovation one solution may be possible. A strategic alliance with intensified cooperation and knowledge sharing through all the processes, on a limited time frame may prove successful and faster time to market, by the end, the danger of imitation should be lessened as Ericsson then already may have moved on with developing new technology. A Swedish based joint R&D partnership will allow both parties to benefit from an intense cooperative experience, while still maintaining other partnerships outside of the country. Such an agreement will provide the governance and organizational structures necessary to frame the collaboration and limit it to a specific project, without relinquishing grasp on competitive advantage.

6.3 Further research and critique of method

This study looks at one collaboration that has taken place from inception to market distribution of a technological innovation. Yet both partners involved in the collaboration have additional partners through an extensive network of customers, suppliers and sub-suppliers. The innovation process extends beyond the principal actors and patent holders of the technology, it is a globalized network which is why setting the research outlook into one country may also be a thing of the past, as the globalization removes borders in terms of both customers and competitors. Thus the network and ecosystem is also bound to further change.

Further research might look into the standardization process, as a global collaborative effort that promotes learning and knowledge sharing within the ecosystem. On the other hand, the technological regimes tend to differ from one country to another, which corroborates the need for several national studies. Another outlook might examine collaboration with direct competitors, and how the knowledge transfer and relational embeddedness are impacted by competition and. Examining the end customer perspective is also an additional perspective one can look upon, has 4G been successful with its final users? How did customers receive this technology?
As for the methods used in this thesis, not including Samsung, a third party supplier providing the access modems to TeliaSonera that interfaced with Ericsson’s network. While it would have provided a complete picture of the 4G rollout in Sweden as a case study, we did not find it necessary in painting the Swedish telecommunications sector from start to finish.

Further, it could be difficult to transfer the results to another sector of choice, however, we do believe that some pointers might be useful for other high technological sectors displaying similar sectoral patterns. In addition, the perspective of the customer was not included in this study, which some may argue does not paint a full picture. However, including the customer perspective in this case brings additional complexities; first of all, it is important to differentiate between business customers and consumers, which is why the authors of this thesis believe that these two perspectives each merit a study of their own perhaps conjoined with a study such as this one.
References


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Appendices

For the sole reason to avoid encumbering the main text with additional information that is not crucial for the analysis or the results of this study the following appendices contain information that was deemed necessary for the overall understanding and framing of the premises this thesis has been built on.

Appendix A

Patents

As with any matter of academic or business-related interest, there has always been a necessity to measure amounts and changes of said amounts over time, innovation and technological change being no exceptions to the matter. Actually measuring it in an accurate manner however, has long been a demanding and complex task. Since 50 years, the resources put into R&D had long been a notable indicator however it is only one of several sources to innovation (Archibugi & Pianta, 1996). Among few other usable indicators regarding technology output are patents and their included details, allowing for measuring inventiveness over countries, regions, firms or individual inventors (Acs, Anselin, & Varga, 2002; OECD, 2009) and has a good correlation with labour productivity and economic growth (Crosby, 2000).

A patent is an intellectual property right, such as trademarks and copyrights. What broadly signifies patents is that it is a legal right to exclude others from making or using a specific invention, a protection that generally lasts 20 years. As far as the European Patent office (EPO) is concerned, stated by Article 52 in the European Patent Convention (EPC), a patent is issued for "... any inventions, in all fields of technology, provided that they are new, involve an inventive step and are susceptible of industrial application" (EPO, 2010, p. 108) The principle with patents is that while an inventor may temporarily exclude others and thus secure an economical benefit, the invention becomes public and others may draw upon that particular knowledge for other types of inventions (Hall, 2006) With incentives as such a society encourages inventive activity and knowledge diffusion, instead of inventors having to rely on secrecy to secure any profits.

Measuring innovation and technological change through patents is not entirely without complications. Prior to 2003, software inventions were not directly patentable (Levine & Saunders, 2004) and are quite essential to the telecommunications sector. However other complications regarding use of patents still exist; innovations, can not only be embodied in registered patents but as disembodied in know-how, licenses, design, specific activities or exist within the skills of the staff (Archibugi & Pianta, 1996). Despite international patent agreements, patent offices of different countries have varying characteristics as in length, cost and effectiveness of the protection they provide, inciting different levels of willingness among inventors to patent an innovation. Risking high costs of litigation may also discourage some firms to patent their inventions, forcing them to seek other means of protection such as industrial secrecy as a more appropriate means of protection, or
avoiding undertaking R&D altogether (Hall, 2006) or focusing on lead time (Cohen, Nelson, & Walsh, 2000). Sectors which innovativeness that are particularly poorly measured by patents are food and tobacco, petroleum refining, basic metals, automobiles and other transport equipment (Arundel & Kabla, 1998).

Despite the critique, the advantage with patents is that they are detailed and readily available in databases for easy country or regional comparison over several periods or technological sectors (Griliches, 1990) internationally often as far back as to the early 1980's. Trade-Related Aspects of Intellectual Property Rights (TRIPS) ensures that the protection a patent grants is as uniform as possible across the globe. Furthermore, patent offices such as EPO ensure a uniform database with the same criteria applied for every applied patent.

RTA Index

As country patent data became more uniform and thus available for international comparison, along came methods to compare certain sectors of countries to those of others, especially with the advent of a patent system as that of EPO covering many countries under the same office with the same criteria for each filing. The revealed technological advantage (RTA) index specifically, can be interpreted as the numerical representation of a specific country's share of patents within a specific sector, compared to that of the (Soete, 1987; Cantwell, 1989; Patel & Pavitt, 1991). Illustrated below is the index equation where $P$ is the number of patents in the specific sector $i$ of host country $j$:

$$RTA = \frac{P_{ij}/\sum_j P_{ij}}{\sum_i P_{ij}/\sum_{ij} P_{ij}}$$

The index is unified suggesting that a value greater than one signifies that a country's sector is specialized or at an advantage compared to the same type of sector in other countries (Cantwell, Dunning, & Janne, 2004). With modification, the index can also be used to internally compare a sector against the patenting all other sectors within the same country.

Sweden's revealed technological advantage

Patent data obtained from the European Patent Office (EPO) (European Patent Office, 2011) was used to compute the RTA index for Sweden. Only granted patents were considered as they are better indicators of the quality of the patent and are therefore more relevant to measure.

The calculated RTA indices for the different fields of technology is presented in Figure 3, where it is apparent that the highest numbers registered in terms of comparative advantage in patenting activity are in the telecommunication related fields. Thus, Sweden seems to have a revealed technological advantage in telecommunication technologies (i.e. basic telecommunication processes, digital communication and telecommunications).
The graph below (Figure 2), charts the evolution of the RTA index in the above-mentioned fields. It can be observed that, albeit for some fluctuations, Sweden’s revealed technological advantage is in a constant increase over the past decade.

This is an indicator of the high involvement of Sweden in this field of technology, and the fact that it possesses a comparative advantage in it can be explained by examining the granted patents applicants. A thorough look at the granted patent applications available on the EPO website (www.epo.com), shows that the large majority of Swedish patents in telecommunication technologies has been granted to companies that evolve in the Swedish ICT sector (e.g. Ericsson, TeliaSonera, Axis…).

Figure 9: Swedish RTA in the telecommunication technological field.
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Figure 10: Detailed RTA index for Swedish patents from 2001-2010
Appendix B

Interview Questionnaire

General questions

1. How important is innovation at TeliaSonera/Ericsson? What are the types and sources of innovations at TeliaSonera/Ericsson (create or acquire)?
2. Would you describe TeliaSonera as an innovative company? If so in what sense?

Inter-firm Cooperation

3. What is your current position in the market? And in the network in general? (In Sweden)
4. How would you describe the telecommunications sector in Sweden? In terms of innovation and embeddedness?
5. How important is inter-firm cooperation to TeliaSonera/Ericsson when it comes to innovative activities (i.e. new product development, R&D etc.)?
6. In the event of an inter-firm cooperation, what is the preferred form of alliance at TeliaSonera? (Arm’s length to Strategic alliance). And how are these partnerships maintained?
7. Are there any specific rules or procedures for inter-firm cooperation? Do you have any guidelines concerning partner selection or does it depend on the project?
8. What are TeliaSonera’s most important partnerships?

Specific case

The following questions concern TeliaSonera’s choice of Ericsson for the delivery and deployment of the 4G(LTE) network in Sweden.

9. Were you involved in this project? Do you think it was a successful cooperation?
10. What was the reason behind that choice? And how was it made (i.e. bidding, closed meetings…)
11. What was the nature of the cooperation? Was it strictly a customer-supplier kind of deal or was it more in depth? Are there any details in the contract that were specific to this partnership?
12. How was the project coordinated and organized?
   a. Governance
   b. Knowledge transfer
   c. Project teams
   d. Vision and goals
13. At which stage of the product development was TeliaSonera involved?
14. What was your overall impression on the information flow? Were there any restrictions from any side of the deal?

15. How would you describe the relationship between TeliaSonera and Ericsson in general?

16. Do you think a tighter relationship between TeliaSonera and Ericsson will enable faster and better innovations to market?
Appendix C: Miscellaneous figures

Figure 11 Ericsson organisation (Ericsson, 2011)

Figure 12: R&D expenditures at Ericsson 2000-2011, Source: Ericsson annual reports (2000-2011)