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International Cooperation and Innovation of Firms in the Service Sectors: Evidence from Norway

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Abstract

In recent years the service sectors have experienced a tremendous expansion in their growth and international activities. Research on service internationalization has started to attract more scholarly attention. However, most of the recent studies have focused on traditional modes of internationalization - such as trade and FDI – and commonly neglected other channels that could be relevant for the internationalization process of service firms. Thereby there is an important gap in the literature related to identifying different relevant channels of internationalization, and the related set of explanatory factors. In particular, there exist very few studies addressing the topic of international cooperation of firms in the service sectors, and few studies try to understand the factors that may explain this type of international activities.

The objective and main focus of this thesis is to contribute to the literature by analyzing the main explanatory factors of international cooperation among service firms in Norway. Besides focusing on firm-level factors that may be of interest – such as innovation, firm size and internationalization barriers – the thesis argues that there exists important sectoral differences in cooperation and patterns, and points this out as a key explanatory factor in the empirical analysis.

In order to address these aspects the thesis applies both quantitative and qualitative methods. The statistical analysis is based on a survey conducted by the Norwegian Institute of International Affairs (NUPI) which includes data on 814 Norwegian firms in all service industries. Furthermore, there were conducted seven interviews with firms located in different sectors of the economy to supplement the statistical analysis and further illustrate the sectoral differences related to international cooperation activities.

The main findings of the thesis are that innovative and smaller firms are more likely to engage in international cooperation. Furthermore, enterprises who engage in international cooperation view physical infrastructure and network building costs the two most important barriers to their process of internationalization. By contrast, geographical distance was found to be a less important barrier. The empirical analysis confirms the existence of substantial sectoral differences related to these results. Enterprises in different service sectors have different propensities to engage in international cooperation and different strategies and motives to do so.

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1.0 Introduction

1.1 Background and objectives

The service sector has experienced tremendous growth, by 2005 the service sectors accounted for approximately 70% of the employment and value added in the OECD countries (OECD, 2005). The employment share of services in Norway has endured the same growth, as the employment rate increased from 40% in 1946 to 77% in 2006 (SSB, 2007). The competitive ability of the service sector is therefore vital for the economic performance in Norway. Furthermore, international economic performance in the service sector is highly important as Norway is a small open economy. Fagerberg, Mowery and Verspagen (2009) emphasize the importance for a small country such as Norway to effectively exploit new knowledge and technology. They argue that this is especially vital because Norway's contributions to the global creation of new knowledge will be of reduced importance when considering the potential benefits to economic growth from exploitation of new knowledge or technology.

Service internationalization has received distinctly less research attention the last decades, while the manufacturing sector has been the main area of research. The bias towards manufacturing has been present decades after services became increasingly important for the economic development and competitiveness in industrialized high-income countries. The expansion of the service sectors international activities has led to a variety of research on the different channels of internationalization. The majority of existing literature on service internationalization has focused on the four GATS modes (e.g. Adlung & Mattoo, (2008); Castellacci, (2012); Castellacci, 2010). These four modes are: (1) cross-border trade (exports), (2) the mobility of foreign clients, (3) foreign direct investments (FDI) and (4) temporary presence of the firms'

personnel abroad (Castellacci, 2012). International cooperation is not included, while FDI and exports have been the main areas of research. However although these traditional modes of internationalization are important for services, firms in the service sector are arguable also engaged in more interactive forms of international activities.

Due to the knowledge-based and interactive nature of many services, international cooperation becomes a highly relevant channel to analyze. International cooperation involves different types of dynamic and interactive relationships between providers and their partners which could lead to new possibilities for the firms. Fagerberg (2003) emphasizes that the sources of different types of important knowledge are present in the interface between the firm and its surroundings, emphasizing the interactions and dynamics with customers and suppliers. Engaging in international cooperation enables firms to access external knowledge and technology which could further enhance their economic performance. International cooperation activities could also be especially relevant for Norwegian services as Norway holds a strong position related to cooperation in innovation, producer-customer interaction, the qualifications of the labor force and the ability to adopt technologies compared with most other European economies (Fagerberg et.al., 2008).

Based on the increasing importance of the service sector for economic development, and the bias towards studies of FDI and export modes of internationalization, the thesis will bring international cooperation to the forefront of analysis. The objective of the thesis is to identify the main explanatory factors of international cooperation patterns among Norwegian service firms. However, the service sector includes a vast variety of industries and therefore sectoral differences will be analyzed as well. Including sectoral differences is one of the key aspects of the thesis, as they have not been investigated related to international cooperation in economics

and innovation studies. The thesis argues that there are important sectoral differences in cooperation and patterns, and it will identify several of these aspects in the empirical analysis.

1.2 General thesis overview

Chapter two presents the theoretical framework and objective on which the research questions are based. Literature on international cooperation, barriers to internationalization as well as service specific characteristics and innovation concepts are also presented and discussed in chapter two.

Chapter three presents the main research questions and general model of the empirical analysis, which are based on the theoretical framework in chapter two. The main research questions are: (1) What are the main factors explaining the international cooperation patterns of service firms in Norway? (2) How do these determinants differ across the service sectors? The conceptual model in chapter three (see figure 1) depicts innovation, firm size and internationalization barriers as potential explanatory factors. However it is expected that the importance of these factors will differ between the sectoral groups. Seven hypotheses are derived from the main research questions and these are presented with a short description of the main theoretical arguments.

Chapter four describes the methods and data used to address the research questions. The statistical analysis is based on a survey conducted by the Norwegian Institute of International Affairs (NUPI) in 2008 and 2009, which includes data on 814 firms from all service industries. Furthermore, firm interviews were conducted in order to access in-depth insights towards the explanatory variables and sectoral differences related to international cooperation. The interviews were conducted to supplement the statistical analysis, applying both methods

improves the quality of the results. In chapter four both methodological processes are described in detail.

Chapter five presents the empirical results of the statistical analysis. The sectoral descriptive statistics are presented in the first part of the chapter followed by the results of probit regressions analysis. The general results indicate that innovative and smaller firms are more likely to engage in international cooperation. Furthermore, firms who engage in international cooperation consider physical infrastructure and network building costs to be the two most important barriers to their internationalization activities. By contrast, geographical distance was found to be a less important barrier for the firms. However there are important sectoral differences related to these results. The main results related to all the hypotheses are summarized in table 9.

Chapter six analyses the main features from the firm interviews and links these finding to the statistical results and the literature.

Chapter seven summarizes the most important aspects of the thesis, presents the main results and provides some implications which can be derived from the thesis.

This thesis provides new evidence to the field of service internationalization. The field of service internationalization has difficulties related to lack of available data, while this thesis used a relatively new data set to address the research questions. Furthermore, the methodology is novel as both statistical analysis and interviews are conducted in the thesis. Sectoral differences related to the explanatory factors of international cooperation are included in the analysis as well. The potential sectoral differences have not previously been addressed in this manner, and the thesis contributes to the literature by illustrating this aspect of service internationalization.

2.0 Theoretical framework

Firms internationalization activities have mainly been analyzed for manufacturing industries, although this bias in the literature has been addresses to a larger extent in recent decades. The rapid expansion of international activities in services has influenced researchers and several new contributions have been made in this field of research. Regarding existing literature on the topic of service internationalization, there have been contributions which analyze the four GATS modes (e.g. Adlung & Mattoo (2008); Castellacci (2012); Castellacci 2010;). As mentioned in chapter one, international cooperation is not one of the four GATS modes and has not been addressed in the same manner.

It is interesting to analyze international cooperation in service firms due to the nature of the service industry, as cooperation is more interactive in nature than FDI or exports. The literature on service innovation, presented in section 2.2, highlights the most important characteristics and explores the tacit and interactive nature of many services. Service innovation has also been neglected in the past and often analyzed within the same framework and conceptualization as used for the manufacturing industry. International cooperation could also be an innovative activity in itself, depending on the motives.

The theory on sectoral specific characteristics and capabilities in services will be presented through a relatively new taxonomy based on innovation studies and economics. Service internationalization is a complex and broad concept. It is argued that it is too broad to be analyzed based on only one theoretical framework, hence this paper will present relevant literature from economics, innovation, management and business studies. The literature on international cooperation is not clear cut, however the next section will highlight some of the

important features related to different types of international cooperation activities and potential determinants.

2.1 International cooperation and potential determinants

Firms engage in international cooperation based on different reasons and have different strategies. The motives for engaging in international cooperation could be e.g. to get access to foreign markets, access to distribution networks, access relevant knowledge, increase sales, reaserch and development (R&D) activities or customer proximity. The service sector is highly heterogeneous and the motives for international cooperation will arguably differ between the sectoral groups. Literature on international network relations, technology partnering and strategic technology partnering (STP) will be presented in this section.

Axelsson and Easton (1992) define networks to involve sets of two or more connected exchange relationships. This definition obviously includes cooperation, which at minimum is an interactive exchange relationship between two partners. There is often high risk involved in other modes of internationalization. International cooperation might be used as a first-best option to establish international relations and networks to access knowledge about foreign markets. Moreover, external relations with international partners could arguably give the firm better premises to engage in successful FDI and export activities in the future. The theory on network relations related to internationalization supports this argument. Sharma and Johanson (1987) emphasize that technical consultancy firms operate in networks of connected relationships which become "bridges to foreign markets", providing firms with the opportunity and motivation to internationalize. Studies based on international network relationships have also indicated that

international cooperation networks, and the access to external resources that follows from these, could be especially important for small firms (e.g. Coviello & Munro, 1995; Korhonen et al., 1996; Kaufman, 1995; Hara & Canai, 1994). Kaufmann (1995) highlights that many small firms have limited abilities to invest abroad due to lack of information, know-how and capital. Therefore smaller firms often use international cooperation as means to go abroad or as a substitute for investments in foreign markets.

Existing literature from business and management studies emphasize that the process of internationalization involves and is influenced by a set of connected relationships that firms develop from their networks (Coviello & Munro, 1997). The literature on international network relations contributes to a better understanding of the nature of cooperation and potential determinants. The network perspective highlights that the nature of established relationships between various partners will influence strategic decisions, and that the network involves resource exchange among its different members (Sharma, 1993). It is important to emphasize that the strategies and access to benefits from resource exchange differs between service sectors; depending on their objectives, absorptive capacity (e.g. the capability to acquire and use new information and knowledge) and competences. Many of these aspects are related to innovative capabilities and characteristics, which will be presented in section 2.2. The resource exchange and possibilities that arise from this exchange depends on the innovative capacity in the firm, therefore innovative firms might engage more in international cooperations.

International R&D cooperation, R&D joint ventures and strategic technological alliances have received vast attention by researchers the last decades (Narula & Hagerdoorn 1999; Archibugi & Michie 1995; Narula 1999; Arvanitis 2009). Although these studies have a technological perspective, the literature presents us with a relevant background for investigating the potential

determinants for international cooperation in the service sector. The growth of the service sector and its importance for the economy has been fueled by the development of knowledge based economies and the development and distribution of ICT. Diffusion and acquisition of new knowledge and innovation is vital for service firms to withstand a competitive position.

Technology cooperation between firms experienced a major increase in the 1980's. Baumol (1992) highlights that firms are not as protective of their technical know-how as previously assumed, and they are more willing to share their technical know-how with other firms. The information technology field is viewed to be highly involved in technological cooperation agreements, followed by biotechnology and new materials. The information technology field is part of the service sector, as well as the source for enabling other service branches to benefit from these technologies. The high cooperation propensity in these technology sectors could be because they represent relatively new technological paradigms which are more knowledge-intensive than before. Moreover, innovative success relies on the absorptive capacity which implies the capability to acquire and utilize new knowledge and information about the situation in the field (Archibugi & Michie, 1995). Furthermore, it is especially important for industries in an early stage to access and utilize new information and share it with others to further develop in their business field (ibid). This implies that innovative success is highly important in a knowledge-intensive environment and the innovative capabilities could be vital to access the potential benefits from engaging in international cooperation.

Firm size could also be relevant for technology cooperation as small firms in an early stage might be more vulnerable and depend upon external knowledge to increase the value of the firm and their competitiveness. The importance of firm size has been analyzed related to the four GATS modes. Henten and Vad (2002) provided empirical findings from the Danish service

sector that highlighted that the propensity for FDI is clearly lower for small firms engaged in internationalization than for larger firms. The lower FDI propensity for smaller firms supports Kaufmann's (1995) previously presented arguments related to the importance of international network relations for smaller firms. These two aspects could imply that smaller firms might use international cooperation as a substitute for FDI.

Strategic technology partnering (STP) is a conceptual phenomenon which includes cooperation and agreements between firms with the objective of affecting the long-term market position for at least one of the firms involved (Hagedoorn, 1993). Furthermore, this literature on STP highlights that firms engage in cooperation and alliances to access and utilize the capabilities of external partners, hence firms with overlapping technological competences are likely to cooperate (Santangelo, 2000). Firms might also use international cooperation to compensate for lack of resources and knowledge. The STP theory emphasizes that firms trying to withstand a competitive position have to find a way to recover the costs from their innovative activities, which often includes increasing its market by expanding abroad. Investing abroad will lead to even higher costs and risk, therefore firms seek international partners which they can share these costs with, instead of expanding through FDI. Harder competitive landscape, the increasing similarity of technologies across countries, cross-fertilization of technology between sectors and increased innovation costs and risk has led to a development in internationalization patterns in which firms use STP as a first-best option (Narula & Hagerdoorn, 1999).

Thus, the underlying innovation related motives in the literature of STP and technology cooperation implies that service characteristics and service innovation is highly relevant as well. Therefore these aspects will be presented in section 2.2.

Firms who engage in international cooperation, or any other mode of internationalization, can be met with certain barriers in their international activities. We might expect the importance of these barriers to vary between firms and especially between the sectoral groups presented in section 2.3.1.

2.1.1 Barriers to internationalization

The barriers to internationalization in services are hard to quantify and measure. Service providers will arguably view the importance of different barriers differently depending on what type of international activities they are engaged in. The most important internationalization barriers for service firms which are mostly emphasized are divided into natural, firm-specific and policy-imposed barriers (Castellacci, 2012). These three branches present a selection of potentially relevant barriers:

(1) Natural barriers: geographical distance, language and cultural differences, lack of infrastructure (implying communication, transport and distribution channels) and network-building costs. (2) Firm-specific barriers: lack of human capital/qualified workers, lack of risk capital. (3) Policy- barriers: Inadequate protection of intellectual property right (IPR), discrimination vis-à-vis national firms (implying both tariffs and non-tariffs), regulations of business activities in foreign markets (e.g. restrictions on sales, marketing, product standards and foreign investment) and regulations towards presence of personnel (e.g. working permission, licenses to operate within a profession and resident permits or visas).

Many of could arguably be especially relevant for our purpose, as e.g. infrastructure, network costs, geographical distance and lack of human capital could relate to services in different ways.

Geographical distance as a barrier to service internationalization is important due to the interactive nature of services, nevertheless the ICT development could arguably have affected this aspect to some degree. Especially in terms of the many innovations, opportunities and structural implications that the emergence and diffusion of ICT has had for the service sector since the 1990s. ICTs are often referred to as the new general-purpose technologies (GPT), and we have experienced tremendous novelty implications through the diffusion of the new GPT on a variety of services, as several multimedia and internet based innovations emerged and spread (Castellacci, 2008). Furthermore, the diffusion of ICT has established a technological platform in which services can be produced and traded (Evangelista, 2000)

The physical infrastructure barrier (implying communication, transport and distribution) could arguably be more important for international cooperation as this barrier includes many of the fundamental factors that have to be present and function at a relatively high level in the economic system. This argument is confirmed in a previous analysis based on a smaller sample of Norwegian service firms (Castellacci, 2010). One of the relevant motives for engaging in international cooperation could be to access distribution networks, as mentioned earlier. A sufficient physical infrastructure is vital to be able to distribute products and services abroad. Furthermore, Castellacci's (2010) analysis also emphasized that network costs are considered to be one of the most important barrier for services.

Policy-imposed, regulatory barriers are also interesting to analyze as we might expect some legal and regulatory differences between countries, which could be time consuming and challenging for service firms when they are engaged in activities abroad. The literature on STP and technology partnering imply that innovation and risk sharing is vital, and that firms engage with

external partners to share knowledge and risk in their activities. Therefore lack of human capital as well as risk capital could be relevant barriers of international cooperation activities.

2.2 Service innovation

Innovation and related inputs is perceived to be one of the main explanatory factors of international cooperation, highlighted previously in section 2.1. Studies of the service sector have outlined several aspects of the peculiar nature of many services. In the following a selection of the most important characteristics and service innovations will be presented. Innovative activities can be highly complex and we should have a broad perspective on this field, as opposed to addressing innovation with a narrow technological perspective. It is important to have a wider understanding of what innovation and innovative activities can encompass, especially when we are analyzing the more heterogeneous and information-and knowledge intensive service sector.

Many service products are *intangible* in nature which make them more difficult to store, transport and export compared to the products produced in manufacturing. Consequently this has led to problems regarding patenting service innovations; nevertheless recently this problem has decreased in sectors such as computer software and services (Miles, 2005). The use and development of information and communication technologies (ICT) has become a key element in service firms' innovation activities, international activities and performance, especially due to the intangible products and the information-based characteristics of services (Evangelista, 2000). In this aspect we are introduced to the importance of ICT as previously highlighted, also referred to as the new GPT. The diffusion of these technologies has been extremely important for

innovation possibilities, e.g. the many multimedia and internet based innovations that have emerged. These technologies have also been the main source for closing the productivity gap between most services and the manufacturing industry, as well as serving as a new technological platform in which new services can be produced and traded (Evangelista, 2000).

Services are also characterized as being highly *interactive*, which implies a close relationship between service providers and clients in certain levels of the service activity. This aspect makes it especially relevant to analyze international cooperation in the service sector, as international cooperations and networks involve two or more connected exchange relationships (Axelsson and Easton, 1992).

The interactive nature of services is closely related to the term *co-terminality*, which implies that many service products are more time and place dependent than manufacturing products, as they are produced and consumed in the context of supplier-client interaction at a certain time and place (Miles, 2005). Co-terminality is characteristic for many services, e.g. most knowledge-based services such as technical consultancy services as well as in less technology-intensive services such as hairdressing. These characteristics can be linked to a service specific innovation activity; the concept of ad hoc innovation. Ad hoc innovation is defined by Gallouj and Weinstein (1997, p. 549) "as the interactive (social) construction of a solution to a particular problem posed by a given client". This concept is especially relevant for consultancy agencies, and many other advanced-knowledge provider service firms.

Organizational factors in the service sector are viewed as key factors which have important implications related to innovation activities (Dejer, 2004; Evangelista, 2000; Gallouj & Winstein, 1997). The importance of organizational factors has brought the definition of innovation to the

agenda, highlighting the importance of an enlarged innovation concept which encompasses organizational change in several forms, not only those related to technological innovations. This aspect can be linked to the concept of *external relationship innovation*, which is as a type of innovation which can be characterized as a subset of organizational innovations. External relationship innovation describes an establishment by a firm of particular relationships with customers, suppliers, public authorities or competitors (Djellal & Gallouj, 2001 in Drejer 2004). It is further emphasized that the concept of organizational innovation includes processes of gathering, managing and using information, which can both be related to the internal organization of a firm and a firms' external organization of relations. Hence, international cooperation can be linked to organizational factors as the firm develops organizational changes by engaging in external international relationships. The nature of external relational innovation has not received too much criticism, as this is a type of organizational innovation which enables firms to prosper from new developments related to their different partners. The prevalent challenge on this aspect is regarding the problems related to measuring organizational innovations. Therefore the firm interviews will provide more detailed insight related to what types of innovations and international cooperations the firms have been a part of.

The organization and delivery of most services is closely associated with comprehensive investment in *human capital/resources* (Evangelista, 2000). Training activities in firms thereby becomes relevant for enhancing the innovative capabilities in the firms.

Non-technological types of knowledge, capabilities and know how might also be important in terms of firms performance and competitive strategies as well as for the international cooperation strategies (Evangelista, 2000). This type of knowledge is presented as "technologies" specific to services, such as e.g. financial, legal and commercial, and the related competencies (Gallouj &

Weinstein, 1997). The non-technological content in knowledge about markets, consumer habits and preferences as well as institutions could be a crucial asset in services (Evangelista, 2000). These types of insights could also be increased through international cooperation by accessing new markets and knowledge about the firms business fields.

Expertise-field innovation describes innovations that detect new needs and respond to these through a process of accumulating knowledge and expertise within services (Gallouj, 2000 in Drejer 2004). The commercialization of these innovations occurs in counteraction with a client. The opening of new markets, creating a competitive advantage based on knowledge and expertise as well as diversification and renewal of product range represent examples of results from expertise-field innovations (ibid). Expert-field innovation is viewed as a clear example of an innovation because of its nature to identify new needs and responding to them, consequently new markets might be opened (Drejer, 2004). We might expect to find examples of expertise-field innovations related to international cooperation activities through the firm interviews.

General remarks on the service characteristics and innovation concepts

These characteristics represent the peculiarities in service activities. However it is important to highlight that the literature on the service sector is still relatively new and the research of distinctive features of innovation in this sector is ongoing. The service sector activities are extremely heterogeneous in nature, thereby making simple generalization of the nature of service innovation highly difficult. Miles (2005, p. 436) exemplifies the relevance of this argument by highlighting that "[a]fter all, the sector includes the most concentrated, knowledge-intensive, and IT-intensive sectors in modern industrial economies (banking, professional services, etc.), as well as the least (retail, cleaning, etc.) ".

2.3 Sectoral taxonomy

The sectoral groups are likely to have different international cooperation strategies and patterns, hence it is relevant to analyze international cooperation in light of a sectoral taxonomy as well. The sectoral taxonomy gives insight to the specific sectoral group characteristics, external sources and capabilities. International cooperation motives and partners are important features in the cooperation strategies. These will arguably differ between the sectoral groups, as well as the innovative capabilities and competences, which will lead to different international cooperation strategies and patterns. It would not be sufficient to solely analyze the potential explanatory factors for international cooperation in the service sector in general, without taking the heterogeneous nature of the service sector into account.

This taxonomy builds upon and combines elements of sectoral classifications from both studies of economics and innovation (Castellacci, 2008), which arguably could lead to a more nuanced picture as these two field are highly related while they simultaneously differ in their approaches. The taxonomy combines elements from both Pavitt's (1984) and Miozzo and Soete's (2001) previous work. Additionally it is interesting to analyze the sectoral differences based on this taxonomy due to the interconnectedness between services and goods, often referred to as "services following goods". Although this phenomenon applies more to wholesale and the retail sector, and less to the information-intensive services, it is fruitful. It has been indicated from empirical research that this interdependency is higher between international sales of services and manufactured goods, compared to the relationship on the home market (Henten & Vad, 2002). Many service and manufacturing goods are integrated, e.g. in wholesale and retail and the same applies for software and hardware providers.

Castellacci (2008) identifies four major sectoral groups according to their main function in the economic system, indicating the functions of each industry in the economic system as providers or recipients of goods and services. Thereafter, each of these groups are divided into two distinct sub-groups based on the technological content that characterizes them, e.g. the overall level of technological and innovative capabilities of firms in the sectoral system. This kind of typology acknowledges the heterogeneity within each industrial block, thereby including features from the work of Pavitt (1984) as well as Miozzo and Soete (2001) in the same framework. The sectoral groups are described with certain characteristics, following the framework for the taxonomy.

2.3.1 The characteristics of the sectoral groups

The four sectoral service groups included in the taxonomy are advanced-knolwedge providers (AKP), network infrastructure services (SIS-N), physical infrastructure services (SIS-P) and personal goods and services (PGS-S).

Advanced-knowledge providers

Advanced-knowledge providers (AKP) are characterized by great technological capability and a significant ability to manage and create complex technological knowledge. Two sub-groups of industries belong to this category: (1) within manufacturing, specialized suppliers of machinery, equipment and precision instruments; (2) within services, these include providers of specialized knowledge and technical solutions like software, R&D, engineering and consultancy. They represent the supporting knowledge base of the ICT paradigm, and also the base which innovative activities in all other sectors are built upon. They continuously upgrade and renew this base. Firms in these industries are typically small-medium firms, and tend to develop their

technological activities in close cooperation with their clients and with the users of the new products and services they create (Castellacci, 2008). This could imply that these firms engage in international cooperation to a larger extent as well. The innovative capability described here resembles the concept of co-terminality, external relationship innovation and ad-hoc innovation, which are some of the service specific characteristics from the service innovation literature presented earlier. This represents an example of how the concepts and activities identified in the innovation literature have been incorporated in the taxonomy and can be related to international cooperation activities. Users and universities are viewed as their main external sources. These firms engage in innovation such as new services and organizational innovation. The innovation expenditures and strategies are based on R&D, training and cooperation.

Network infrastructure services and physical infrastructure services

Supporting infrastructural services (SIS) mostly produce intermediate products and services rather than items for personal consumption. They differ from advanced knowledge providers in terms of their technological capability, more precisely their more limited ability to develop new knowledge internally. Two sub-groups of sectors are distinguished here:

(1) *Network infrastructure services* (SIS-N). Industries in this sector are e.g. post and telecommunication, financial intermediation, insurance and auxiliary financial services. Large firms are the dominant firm size. Their major function and relationship to the technological paradigms is that these industries constitute the supporting infrastructure of the economy and obviously make active use of ICT. Furthermore; these industries are characterized by medium technological capabilities, and use ICT developed by other more advanced industries, to be able to increase the efficiency of their processes and the quality of their services. Their main external sources are suppliers and users, and they engage in process innovation, service innovation and

organizational innovation. These industries base their innovation expenditures and strategies on R&D, acquisition of software and training (Castellacci, 2008).

(2) *Physical infrastructure services* (SIS-P) (e.g. transport, wholesale trade, water transport and auxiliary transport services). These industries differ from SIS-N services in that this group represents more traditional industries, where the main function is to provide a set of services related to the physical infrastructure of the economy. As with the sectoral group SIS-N, this sector is dominated by large firms. SIS-P industries do not have the same capabilities as SIS-N industries in terms of making heavy use of ICTs to increase their performance. Furthermore, SIS-P industries also have lower opportunity levels related to innovative capabilities. The main function and relationship to a technological paradigm is that these industries represent the supporting infrastructure of the Fordist paradigm. Their suppliers are the main external sources. Process innovation is the type of innovation to be expected from these firms and the innovation expenditures and strategies are based on the acquisition of machinery and software (Castellacci, 2008).

The similarities between the two infrastructure service groups are that they both represent the supporting infrastructure in which firms in the rest of the economy bases their business and innovative activities upon. The more advanced this supporting infrastructure is, the easier the process of inter-sectorial knowledge diffusion within the domestic economy, and the more efficient and productive the national system will be (ibid). These two sectoral groups are important in Norway. The industrial specialization in Norway, especially in the petroleum and maritime sector, has had enormous implications for the economic development and the competitive abilities in other sectors of the economy. The infrastructure in Norway had to follow the developments in these fast growing sectors since the oil boom started in the 1970's. Thereby

one might argue the service groups that operate related to the infrastructure in Norway have a strong position related to their counterparts in many other countries. Lack of physical infrastructure abroad was also one of the barriers to internationalization presented earlier. Physical (as well as network) infrastructure is obviously important and affects the economic and innovative opportunities of firms' international cooperation activities.

Personal goods and services

*P*ersonal *goods and services* (PGSs) define the fourth sectoral service group in the taxonomy. These service industries are characterized by the lowest technological content and a more limited ability to develop new products and processes internally. Their dominant innovation strategy is typically based on the acquisition of machinery, equipment and other types of external knowledge produced by their suppliers. Small-medium sized firms is the dominant firm size. PGSs firms are mostly recipients of advanced knowledge, and these firms are typically hotels and restaurants. PGSs industries are supplier-dominated and have low technological capabilities and opportunities. These industries engage in less advanced innovations, such as process innovation (Castellacci, 2008).

Relevance for the objective of the thesis

Thereby the four sectoral service groups from the taxonomy are the following: advanced-knowledge provider (AKP) services, network infrastructure services (SIS-N), physical infrastructure services (SIS-P) and personal goods and services (PGSs). The empirical relevance of the sectoral taxonomy has been tested through the use of Community Innovation Surveys (CIS) for European countries, which provided empirical support for the sectoral taxonomy and the implied innovation capabilities and main economic functions in each group. Castellacci's

(2008) taxonomy combined with empirical data from the service sector can be used to identify and highlight the relationships, differences, interactions and innovation density among firms in the different sectoral groups. Conducting analysis based on this taxonomy brings more attention to the hitherto neglected service sectors and the heterogeneity among these sectoral groups. Thereby, the taxonomy could contribute to a better understanding of the sectoral differences related to the international cooperation patterns and determinants.

Furthermore, analyzing data in light of these sectoral groups could present a more nuanced picture of the economic system in which these groups coexist. The different characteristics and innovation related capabilities in the sectoral taxonomy could be one of the factors leading to different internationalization patterns and strategies among service firms. It is an interesting perspective to include when analyzing international cooperation patterns, strategies, determinants and differences in the Norwegian service sectors. Survey data on a national level can be used to investigate the interconnections and peculiarities in a country's service industry, providing policymakers with a better foundation towards developing an improved framework for international cooperation and innovation policies.

3.0 Model and research questions

The expansion of the service sectors international activities has contributed to a variety of research on the different channels of internationalization. The majority of existing literature is nevertheless biased towards the four GATS modes. International cooperation has not been explored to the same extent, while FDI and export have been the main areas of research. The service specific characteristics highlighted in the previous chapter underline the importance of addressing other more interactive forms of international activities. The main research questions in the thesis are motivated by the gaps in the literature related to potential explanatory variables for international cooperation, sectoral differences and different international cooperation strategies. Innovative capabilities, firm size and certain types of barriers to internationalization could be important for international cooperation. These factors, as highlighted in the previous chapter, could be explanatory for the cooperation patterns.

The complexity and heterogeneity that characterizes the service sector in today's knowledge-based society makes it fruitful to investigate the potential differences between the sectoral groups. All four sectoral groups have not been comparatively analyzed with the objective of identifying potential differences related to international cooperation strategies and patterns. Existing literature and empirical studies mainly focus on specific industries, e.g. software industries or R&D industries. Providing insights from the sectoral groups can contribute to a better understanding of the heterogeneity among services in their international cooperation pattern and strategies.

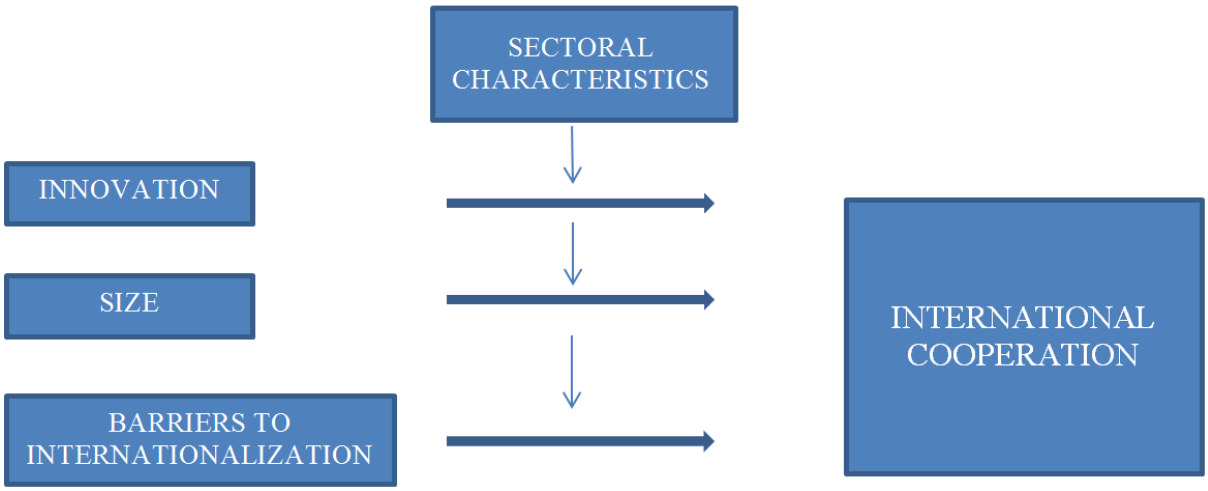
The general research questions to be analyzed in this paper are the following:

1. What are the main factors explaining the international cooperation patterns of service firms in Norway?
2. How do these determinants differ across the service sectors?

These questions provide us with a general framework, and will lead to several hypothesis which will be presented in section 3.1. The general explanatory model for the empirical analysis, with the potential explanatory variables is presented in figure 1. This model presents a conceptual framework and a general overview of the main factors which will be included in the empirical analysis.

Innovation, firm size, barriers to internationalization and sectoral differences represent the main factors to be analyzed related to international cooperation. The sectoral differences will be used in the analysis to explore how the innovation, firm size and barrier factors differ between the sectoral groups. These factors will also be analyzed related to international innovation cooperation, in order to compare the relevance and importance of the explanatory factors. Each of these general factors will be analyzed through representable variables in the survey, supplemented by the firm interviews. The firm interviews will elaborate in greater detail on the international cooperation activities, and will function as a complementary analysis to the statistical analysis. Seven internationally active firms were interviewed, and each sectoral group is represented by the firms.

Figure 1: Basic Explanatory Model



3.1 Hypothesis

The general research questions will be addressed in more detail through four main hypotheses:

Hypothesis 1: The innovative capability in service firms is positively related to the international cooperation propensity.

Hypothesis 1 is, in light of the literature presented in chapter two, a natural starting point. STP, technology cooperation and some of the service characteristics indicate that innovative capability is important when firms engage in international cooperation. The service innovation concepts such as ad-hoc innovation, external relationship innovation and expertise-field innovation are especially relevant for services and are often conducted in relation to external partners

(Evangelista, 2000; Drejer, 2004; Gallouj & Weinstein, 1997). STP is motivated by innovative activities, in terms of sharing the costs and risks of innovation as well as increasing the firm value and market positions (Santangelo, 2000; Narula & Hagerdoorn, 1995). The ICT development has also contributed to new technological paradigms which are more knowledge-intensive and require strong innovative capabilities to access and acquire relevant and new information from cooperations (Castellacci, 2010; Archibugi & Michie, 1995). Firms engage in international cooperation to benefit from these activities and thereby absorptive capacity and innovative capability is important to be able to access the potential benefits that become available. Hypothesis 1 will be tested by using the two variables innovation and R&D abroad in the survey, complemented by the interviews which will emphasize what type of innovation the firms have introduced recently.

Hypothesis 2: We expect that smaller firms have a higher propensity to engage in international cooperation.

The second hypothesis relates to the existing literature on STP and network relations which emphasize the increasing risks and costs that follow investing abroad as well as in engaging in innovative activities. Foreign investments often lead to higher risks and initial costs for the firm (Narula & Hagerdoorn, 1999), which small firms arguably could be more vulnerable towards. International cooperation is a type of network and could be especially important for smaller firms' internationalization activities (Coviello & Munro, 1995; Korhonen et al., 1996; Kaufman, 1995; Hara & Canai, 1994) due to lack of capital, information and know-how. Thereby, small firms might engage more in international cooperation and use this as their first-best option to go

abroad. Hypothesis 2 will be tested by measuring firm size indicated by the number of employees.

Hypothesis 3: Among the different barrier to internationalization we expect that physical infrastructure and network building costs are more important barriers for firms who engage in international cooperation. Whereas; geographical distance is expected to be a less important barrier for service firms.

Hypothesis 3 is related to the selection of the most relevant barriers for internationalization as well as the ICT development and the enabling effect that the diffusion of these GPT technologies have had for the service sectors. It is important for firms who engage in internationalization, such as international cooperation, that these foreign relations and operate in an area with sufficient physical infrastructure in place. Castellacci (2008) highlights that all firms in the economy base their business activities and innovative activity upon the infrastructure available. It is therefore important for Norwegian service firms which engage in international cooperation that the infrastructure is adequate in the foreign areas they engage in as well. Network building costs are expected to be a more important barrier for firms who engage in international cooperation as well, based on existing empirical results from a previous internationalization analysis which was conducted on the service sector in Norway (Castellacci 2010), although with a smaller sample than the survey used in this paper. Geographical distance is expected to be a less important barrier for firms who engage in international cooperation, due to the ICT development and its implications for services the last decades. The tacit and interactive nature of many services is not

as hampering for their diffusion possibilities. The ICT development has decreased the gap between many services and tradability, as well services dependence upon geographical proximity (Castellacci, 2008; Evangelista, 2000). The expanded use of novel possibilities that emerged from the ICT development, such as multimedia and internet based solutions for storage and distribution, has decreased the importance of geographical proximity in service internationalization .

The hypotheses regarding sectoral differences related to international cooperation will be divided into four separate hypotheses. Sectoral differences will be analyzed by using the sectoral taxonomy presented in chapter 2. The four hypotheses are based on characteristics from the taxonomy as well.

Hypothesis 4: The factors affecting international cooperation vary between different sectoral groups. In particular:

H4a: Innovation is a more important determinant of international cooperation for firms in the advanced-knowledge provider sector.

Hypothesis 4a is based on the characteristics from the sectoral taxonomy presented earlier. AKP service firms include industries such as software, engineering, consultancies, R&D labs and other knowledge-intensive industries with high technological opportunities and those that can manage and create complex technological knowledge. These firms are continuously updating their knowledge foundation, and represent the supporting knowledge base of the ICT paradigm (Castellacci, 2008). AKP service firms have the highest innovative capacity of all the sectoral groups. Additionally AKP represent the supporting knowledge base which all other industries base their innovative activities upon, and are continuously updating this base (ibid). Therefore

these firms have to seek new opportunities and access relevant external sources for their field to a higher degree than the other less innovative sectoral groups. Because of this Innovation might be more important for AKP service firms who engage in international cooperation. Furthermore; these firms international cooperation activities could be more related to innovation projects than the other sectoral groups.

H4b: Physical infrastructure is a less important barrier for firms in the advanced-knowledge provider sector and a more important barrier for firms in the physical infrastructure service sector.

Hypothesis 4b is related to the sectoral characteristics in the taxonomy as well. AKP service firms are more technologically advanced compared to the other sectoral groups, as they represent the supporting knowledge base for the ICT paradigm (Castellacci, 2008). The new GPT are available, nevertheless these technologies are highly complex and not all industries use the full potential from these technologies. AKP service firms have the capabilities to produce new technologies (e.g. software solutions) as well as access and use complex digital information systems to a higher degree than the other sectoral groups. The digitalization of information has enabled communication and cooperative work; as well as increased knowledge diffusion across borders (Ernst et.al., 2002; Hildrum & Fagerberg, 2002). It is therefore expected that AKP service firms do not depend as much on physical infrastructure

SIS-P firms depend on the physical infrastructure, hence this is expected to be a more important barrier for SIS-P firms. They deliver their services directly related to the physical infrastructure

and they are not characterized with high opportunity levels in terms of technological capabilities (Castellacci, 2008).

H4c: Network building costs is a more important barrier for firms in the network infrastructure service sector.

Hypothesis 4c is related to the inherent characteristics of SIS-N firms. Firms in this sectoral group are typically post and telecommunication, insurance and financial intermediation which represent the supporting infrastructure of the economy and are obviously active users of ICT (Castellacci, 2008). These industries are dependent upon ICTs and other technological networks and will not succeed in their foreign expansions without the necessary network infrastructure in place. E.g. telecommunication companies are dependent upon a high quality mobile network and capacity to be able to serve their customers. These industries are expected to be more dependent upon complex networks than the other sectors; therefore network building costs could be a more important internationalization barrier for these industries compared to the other sectoral groups.

H4d: The geographical distance is a less important barrier for advanced-knowledge provider firms.

Hypothesis 4d presents geographical distance as a less important barrier for AKP service firms. These firms represent the knowledge base for the ICT development and are the most knowledge- and technologically intensive industries in the whole service sector, with extremely high opportunity levels (Castellacci, 2008). The ICT development has further enabled services to be

more easily produced and traded (Evangelista, 2000), without the dependence of geographical proximity. It could therefore be expected that geographical distance is a less important barrier for AKP service firms; the most technologically advanced and knowledge-intensive sectoral group. AKP service firms are arguably in the position to access and benefit the most from new to market ICT solutions which they can use related to their international cooperation partners, hence geographical distance is expected to be a less important barrier.

4.0 Data and methods

This thesis will use quantitative methods supplemented by qualitative methods to address the research questions and hypothesis. This main reason for using both methods concerns validity and reliability implications, with the objective of strengthening the quality of the results. The interviews were conducted as an attempt to answer the most common critique of statistical analysis. Quantitative and qualitative analysis have different strengths and weaknesses. While statistical analysis can identify general patterns amongst a large sample of firms, interviews can contribute with more in-depth insights from selected firms related to their activities. Combining these two methods will strengthen the quality of this study as well as enabling a wider and more nuanced empirical analysis. In particular, the innovation variable, this is a highly complex concept, including the service innovation concepts presented earlier which are often hard to measure precisely. In statistical analysis we therefore have to use the best available variables that represent innovation and use these indicators to analyze the potential relationships with international cooperation, equipped with a large sample of observations. However using

interviews, we can depict more details about the specific types of innovations that have been introduced and further analyze the capabilities in the firms. These two methods supplement each other and using them both provides a stronger platform to address the research objective of this thesis. In the following the methods and empirical sources will be presented and described. The reliability and validity of the study will be considered in section 4.3 and 4.4.

4.1 Data and quantitative methods

The dataset used for the quantitative part is based on the Service Internationalization Survey (SIS) which was conducted at the Norwegian Institute of International Affairs (NUPI) during 2008 and 2009. This dataset is relatively new and currently the only available micro dataset based on the service sector in Norway, with the possibility of also conducting a sectoral analysis. This data set is collected through a questionnaire survey among Norwegian service firms and aims at providing new empirical evidence on the main channels, strategies and patterns of internationalization followed by firms in different service industries. It was a web-based survey which was sent to all Norwegian service firms with more than ten employees in 14 different industries. The questionnaire was sent to 4230 firms which resulted in 814 firms who responded and filled out the questionnaire, corresponding to a satisfactory respond rate of 19 per cent (Castellacci, 2012). The industries included in this dataset represent a wide range of the service branch of the economy and include industries characterized by high international propensity as well as more domestically oriented industries. The 14 industries include e.g. software, R&D, other business services, financial intermediation, insurance, post and telecommunications, auxiliary financial services, hotels and restaurants, sale, maintenance and repair, wholesale trade, retail trade, land transport, water transport and auxiliary transport services. Response rates across

the sectors range between a minimum of 11 per cent to a maximum of 35 per cent (Castellacci, 2012).

The questionnaire includes 25 questions and is composed by the following parts:
(1) General information about the firm; (2) International sales; (3) International sales of new services; (4) International cooperation; (5) International cooperation in innovative projects; (6) R&D internationalization; (7) Barriers to internationalization. While parts 1 and 7 refer to firms' characteristics and international activities in more general terms, parts 2 to 6 specifically relate to different internationalization channels. The questionnaire is attached in Appendix A.

My statistical analysis focuses on the most relevant indicators for the potential determinants of international cooperation and strategies. As pointed out in figure 1 in chapter three, the identified factors to explain international cooperation in the survey are innovation, firm size, and barriers to internationalization. Furthermore, I will also use indicators on the importance of types of cooperation motives and partners to investigate the strategies and patterns of international cooperation; identify the geographical regional distribution and the sectoral differences. These aspects are included in the data set as well. The main indicators that are included in the statistical analysis are described in the following:

International cooperation: A dummy variable indicating whether the firm had any international cooperation activities during 2004-2006. Yes = 1, No = 0. This variable is the dependent variable in the probit regressions (see table six).

International innovation cooperation: A dummy variable indicating whether the firm had innovation cooperation with other international partners during 2004-2006. Yes = 1, No = 0. This is the dependent variable in the second pobit regressions (see table seven).

Innovation and firm level characteristics:

Innovation: A dummy variable indicating whether the firm introduced new or significantly improved services during the period 2004-2006. Yes = 1, No = 0.

R&D abroad: A dummy variable indicating whether the firm had R&D facilities abroad. Yes = 1, No = 0.

Firm size: A variable indicating the number of employees, including part time, in 2006. Ranging from 1-7.

1= 0-9 employees. 2 = 10-19 employees. 3 = 20-49 employees. 4 = 50 – 99 employees. 5 = 100-249 employees. 6 = 250-499 employees. 7 = 500 or more employees.

Internationalization barriers:

All of the previously listed barriers (see section 2.1.1.) are measured in the survey. There are a total of ten different barrier variables and the respondent firm indicate the extent to which it considers each of these as important. In the statistical analysis the three most important barriers for the whole sample will be used, which turned out to be: Geographical distance, lack of infrastructure and network-building costs. The importance of barriers is hard to quantify and to measure the exact value. Nevertheless we get a proxy measure. The indicators are categorical, ranging from 1-4.

1 = not important, 2 = low importance, 3 = medium importance, 4 = high importance.

The variables representing innovation and firm level characteristics and the barriers to international cooperation are the independent variables in the regressions.

International cooperation partners:

There are eight different international cooperation partners represented in the survey. These eight are: other enterprises within the enterprise group, suppliers, clients, competitors or other enterprises in the same industry, consultants, commercial labs or private R&D institutes, universities or other higher educational institutes and public research institutes. The firm indicates the importance of each of these types of international cooperation partners during the period of 2004-2006. Every international cooperation variable has the same categorical indicators as the barrier variables (1-4), providing a proxy measure of the importance of different types of international cooperation partners and motives. The importance of international cooperation is also hard to quantify and to get an exact measurement. Nevertheless we can get a proxy measure. The indicators are categorical, ranging from 1-4.

1 = not important, 2 = low importance, 3 = medium importance, 4 = high importance.

Motives for engaging in international cooperation:

The questionnaire includes a question about what the purpose of the firms' international cooperation was during the period 2004-2006. There are eight different motives represented and these are: public co-financing, adding to the qualification of the workforce, access to know-how, R&D, production, sales, access to distribution networks and proximity to customers. The indicators are categorical, ranging from 1-4, and provide us with a proxy measure.

1 = not important, 2 = low importance, 3 = medium importance, 4 = high importance.

Regional location:

By computing regional dummies we get insight towards the regional distribution of respondent firms, and use them as control factors. The five main regional areas in Norway were a natural

choice for this purpose (Sørlandet, Vestlandet, Østlandet, Trøndelag, Nord-Norge) It could be interesting to supplement the research questions with the relationships between regional locations and the international cooperation propensities.

Sectoral dummies:

The sectoral dummies are used as control variables as well. They are important to include as control variables as the sectoral differences are an important aspect in the model (see figure two). Every respondent firm is categorized in terms of which sectoral group they belong to, based on the taxonomy presented earlier.

AKP: 1 = the firm is a part of this group. 0 = the firm is not a part of this group.
SIS-N: 1 = the firm is a part of this group. 0 = the firm is not a part of this group.
SIS-P: 1 = the firm is a part of this group. 0 = the firm is not a part of this group
PGSs: 1 = the firm is a part of this group. 0 = the firm is not a part of this group

General descriptive statistics

Before the qualitative part of the thesis will be described, the general descriptive statistics will be presented (see table 1). Table 1 presents the general descriptives statistics for all the firms. These indicate that on average 39,4 % of the firms engage in international cooperation. 33,2 % of the firms engaged in innovation during the period. 6,3 % of the firms have R&D activity abroad, which is another indicator of innovative activity. The firms engage less in R&D activity abroad, which is in line with the general assumptions of the service sector as a less R&D-intensive sector of the economy. The average firm size in terms of number of employees is measured to be 4,7, which indicate the average to be in the higher range between 99 and 249 employees. The most important barriers to internationalization are network cost (2,0), infrastructure (1,8) and distance

(1,7), and therefore these barriers are included in the regression analysis. It is interesting that geographical distance is viewed to be a less important barrier to internationalization than the other two, in line with the literature which emphasizes that the ICT development has brought new possibilities for many services internationalization activities (e.g. Evangelista, 2000; Castellacci, 2008).

The most important cooperation partners for the firms in the sample are customers, suppliers and other enterprises within the enterprise group. Public research institutes, R&D labs and universities do not seem to represent relevant cooperation partners. Sales, customer proximity, access to know how and distribution networks seem to be the most important motives for the firms international cooperations. Many of these motives are in line with the literature on international cooperation networks, technology partnering and STP, such as e.g. access to know how. This supports the need to access external knowledge and resources to withstand a competitive position.

The majority of the firms in the sample are located in the eastern (62, 4%) and western (18, 9%) parts of Norway. Nevertheless the regional distribution is fairly similar across the sectoral groups as well. The survey results are not biased, as the regional distribution of the firms in the survey corresponds to the firm population in Norway, which is concentrated in the eastern part of the country. 35, 8% of the firms are part of the sectoral group AKP, 20% of the firms represent PGS, 9, 7% represent SIS-N while 34, 3% represent SIS-P.

Table 1: General descriptive statistics

	Variable	Obs	Mean	Std. Deviation	Min	Max
Innovation and firm characteristics	**International cooperation**	724	.3936464	.4888957	0	1
	Innovation	787	.3316391	.4711015	0	1
	R&D abroad	713	.0631136	.2433379	0	1
	Employment	810	4.707407	1.517779	0	7
Barriers	**Infrastructure**	782	1.832481	1.078871	1	4
	Networkcost	784	2.007653	1.154675	1	4
	Distance	782	1.741688	.9824458	1	4
Cooperation partners	**Enterprise group**	786	1.520356	1.067275	1	4
	Suppliers	786	1.688295	1.140249	1	4
	Customers	786	1.688295	1.155784	1	4
	Competitors	785	1.411465	.8269202	1	4
	Consultants	786	1.361323	.7532386	1	4
	R&D labs	786	1.206107	.5627624	1	4
	Universities	786	1.235369	.6155695	1	4
	Public research inst.	785	1.191083	.536116	1	4
Motives	**Publicfunds**	781	1.194622	.5800281	1	4
	Workforce qualific.	782	1.404092	.8454949	1	4
	Access to knowhow	784	1.595663	1.036268	1	4
	R&D	782	1.375959	.8186901	1	4
	Production	781	1.449424	.9386653	1	4
	Sales	779	1.658537	1.129854	1	4
	Distribution networks	782	1.546036	1.028308	1	4
	Customer proximity	782	1.603581	1.095393	1	4
Regional location	**East**	814	.6240786	.4846577	0	1
	West	814	.1891892	.3918996	0	1
	South	814	.0307125	.1726438	0	1
	Trondelag	814	.0798526	.2712315	0	1
	North	814	.0749386	.2634541	0	1
Sectoral groups	**Akp**	814	.3587224	.4799204	0	1
	Pgs	814	.2014742	.401348	0	1
	Sis-N	814	.0970516	.29621	0	1
	Sis-P	814	.3427518	.4749212	0	1

4.2 Data and qualitative methods

In addition to using quantitative data, there have been conducted interviews with seven firms to supplement the statistical analysis. Firms from each of the four sectoral groups are represented by the interviews and these form the empirical basis for the qualitative part of the study. The interview process lasted for from May to September 2012, including the initial process of developing the interview guide, conducting the interviews and analyzing the results. Each interview duration was approximately one hour. The objective of conducting interviews was to further explore the types of international cooperation networks and strategies of the firms. Furthermore I attempted to get a more in-depth analysis of the complexity that lies in service innovation and the importance of innovation related to the international cooperation activities in the firms. The interview guide is closely related to the main variables included in the statistical analysis and further includes aspects related to the causality between firms' international cooperation and other internationalization modes, importance of ICT for the firms and the importance of international cooperation compared to domestic cooperations. Appendix B presents the interview guide.

The firm selection was based on the sectoral groups in the taxonomy and their characteristics. Given that one of the main objectives of the thesis is to identify sectoral differences related to international cooperation, firms from each sectoral group were included. Thereby they are representative sources for the thesis. In addition, I have selected both large and smaller firms to see whether the size of the firm affects its international cooperation activities. It was attempted to interview two different types of firms from each sectoral group. This was successful for all the sectoral groups except the PGSs group, which is represented solely by Thon Hotels. In the firm selection I also attempted to include internationally oriented firms from each sector, to be able to

investigate the research questions adequately. The firms will be presented in the following. Each firm and interviewee will be named, with consent from each of the interviewees.

The sectoral group advanced-knowledge provider (AKP) service is represented by Det Norske Veritas (DNV) and Csam Health AS:

Csam Health AS is a Norwegian software and development company, which focuses exclusively on developing clinical software solutions for healthcare. They primarily offer integration software solutions, furthermore they have support services such as consultancy related to their existing products. The company was initially established as a project at Rikshospitalet University Hospital, initiated internally by the Norwegian healthcare sector. Thereby the fundaments for their innovative services were developed from ideas, concepts, models, technologies and software components stemming from hospitals. These were commercialized in different segments of the healthcare sector and became part of the product portfolio at Csam Health as we know it today, which was bought by private investors through Forefront Innovation in 2005/2006. The company has two foreign offices and a total of 80 employees. In 2011 the turnover was approximately 71 million NOK. The interviewee was Glenn Kenneth Bruun, Director for Innovation and Strategy.

DNV is organized as an independent Norwegian foundation. DNV offers a variety of services to their customers ranging from certifications and classifications to in-depth risk analysis, consultancy services, software solutions, laboratory tests and training. One of their main objectives is to identify future development trends and potential areas of interest. DNV is divided into three companies with globally leading positions. These are DNV Maritime and Oil and Gas which is the companies initial area of expertise, DNV KEMA Energy and Sustainability and

DNV Business Assurance. DNVs objective is constantly to identify and access new technologies, markets and opportunities. DNV has offices worldwide and several offices located in Norway, with a total of 10400 employees worldwide. DNV's turnover in 2011 was 10,156 billion NOK. The interviewee from DNV was Jannicke Witsø, employed as an External Relations Advisor.

The sectoral group network infrastructure services (SIS-N) is represented by Telenor and IF:

Telenor is a company that mainly operates in the telecommunication business. Telenor is also a distributor of TV-signals, fixed-line telecom as well as mobile signals. Telenor Group is one of the leading mobile operators in the world with offices worldwide. The company has 30 000 employees on a global basis. The turnover in 2011 was 98, 5 billion NOK. The interviewee was Dag Ragnar Larsen, employed as Research Leader in Telenor ASA and Project Leader in Canal Digital, which is a company owned by Telenor.

IF is a Nordic insurance company which covers all insurance areas and has a strong presence in Europe. IF is owned by a Finnish company, while the administrative headquarters are placed in Sweden. The company is the largest injury insurance actor in the Nordic area. The company has approximately 6300 employees, with approximately 1800 employees in their Norwegian offices. This interview is mostly based on the activities in the department of Foreign Claims in car injuries, which is a small internationally oriented department located in IF's Norwegian headquarter. Jens Gravdal was the interviewee, the Nordic Executive for Foreign Claims in car injuries.

The sectoral group physical infrastructure services (SIS-P) services is represented by H Strøm AS and Antra AS:

H Strøm is a traditional transport company. It transports and delivers goods from European countries to Bergen, Oslo or Trondheim. The company started in 1976, with traditional road transport. In 2003 the company initiated Rale Terminal Drammen (RTD) in which they started to utilize the railway for their transport services, which had previously not been done in their commodity market in Norway. They receive railway carriages which have been loaded in several European countries with goods ordered by our Norwegian customers, such as e.g. ICA, Rema and Norsk Stål. After RTD was started, 99 per cent of the company's operations have been railway transportations. H Strøm does not have any foreign offices. They have 20 employees in their two Norwegian offices. The turnover for 2011 was 80 million NOK. The interviewer was Lars Strøm, Managing Director and the owner of the company.

Antra AS sells and delivers technical equipment to ski resorts. They deliver the equipment to the Norwegian market, which is the biggest in terms of cross country track preparation machines on a global basis, as well as a marginal share to Greenland and Denmark. The company is one of the market leaders in their field. Antra AS does not have any foreign offices, and they have 20 employees in their two Norwegian offices. The turnover in 2011 was 80 million NOK. The Managing Director of the company, Fredrik Lien, was the interviewee.

The sectoral group personal goods and services (PGSs) is represented by Thon Hotels:

Thon Hotels is a department in Thon Gruppen, which is primarily involved in hotel operations and property. Thon Hotels manages the hotel- and restaurant operations, and mainly operates with travel service activities, conference activities and restaurant activities. Thon Hotels is one of

Norway's leading hotel chains with 60 of their 67 hotels located in Norway, and was therefore selected for the interviews. Thon Hotels has a total of 5500 employees (the majority of the hotels in Norway have approximately 10-15 employees). The turnover in 2011 was 2,6 billion NOK. The interviewer was Morten Thorvaldsen, the Managing Director of the company.

4.3 Reliability, validity and ethical concerns

There will always be some reliability and validity challenges when conducting a research study. In an attempt to minimize these challenges, both quantitative and qualitative methods were used in this thesis. The dataset conducted from the survey is based on the respondents own perceptions of their firms activities. We can not be sure how well informed the person that filled out the questionnaire was. Surveys also have a subjective element in that the respondents might have different perceptions of e.g. what defines a new or significantly improved service, which is one of the indicators used to indicate innovation in the firm. The interviews function as a supplement to these aspects, to get a better understanding of the precise activities in the selected firms.

The heterogeneous and intangible nature of international cooperation and innovation in services is hard to quantify and measure precisely, nevertheless the dataset provides us with several proxy measures to be able to identify patterns and analyze relationships. These will not give a detailed measure of the complexity of the international cooperations nor the types of innovation introduced which might affect the validity of the empirical analysis. However these validity concerns will be addressed by supplementing the survey data with qualitative data from the interviews. The interviews represent selected and relevant firms from all the sectoral groups and

the main features from these interviews are presented with two objectives. First of all to highlight aspects which the statistical analysis is not able to capture. Secondly, to emphasize the relevance of in-depth information about the strategies and activities. The firm interviews are conducted later in time and are included as a quality enhancing methodological tool to supplement the statistical results. Quantitative and qualitative methods could thereby complement each other. The statistical analysis can identify general patterns amongst a large sample of firms, while interviews can contribute with more in-depth insights from selected firms related to their activities. By using both methods the results become more reliable.

Regarding ethical issues, NUPI conducted the data collection in a highly professional manner, with no external access to information on the participating firms. During the interview collection, every firm was informed about the thesis and main objectives forehand. Before each interview started, I asked for consent to use the information from the interview a well as permission to name the firm and interviewee.

5.0 Results of the statistical analysis

Before investigating the explanatory factors of international cooperation by conducting probit regression analysis, the sectoral descriptive statistics will be presented.

5.1 Sectoral descriptive statistics

5.1.1 Advanced-knowledge provider (AKP) service firms:

Table 2 presents the results of the descriptive statistics for service firms in the sectoral group AKP. The share of AKP service firms who engage in international cooperation (38,4 %) is marginally lower than the sample average. The share of innovative firms among AKP is 34,1% and above the sample average. AKP service firms are above the average in terms of R&D abroad (6,8%). Both innovation indicators are above the sample average, in line with the literature on the taxonomy which implied that this sector is highly innovative.

The size of the firms in terms of number of employees indicates that AKP service firms are only marginally below the sample average, nevertheless still in the category small-medium enterprises. AKP service firms seem to consider network costs as the most important barrier (2,17) to their internationalization, while considering infrastructure (1,84) to be less important than the two others. Customers, suppliers and other enterprises within the enterprise group seem to be the most important international cooperation partners for AKP service firms, with customers representing their most important cooperation partner. Furthermore, these firms seem to view sales and access to know how as their main motives for their international cooperation activities. Distribution networks and customer proximity is also important for AKP service firms.

Table 2: Descriptive statistics for the sectoral group AKP

Sectoral group: Akp

Variable	Obs	Mean	Std. Deviation	Min	Max
International cooperation	268	.3843284	.4873462	0	1
Innovation	284	.3415493	.4750664	0	1
R&D abroad	265	.0679245	.2520924	0	1
Employment	289	4.681661	1.532872	0	7
Infrastructure	282	1.840426	1.063498	1	4
Networkcost	282	2.177305	1.197766	1	4
Distance	283	1.883392	1.019581	1	4
Enterprise group	283	1.505300	1.069802	1	4
Suppliers	283	1.628975	1.088369	1	4
Customers	283	1.674912	1.157908	1	4
Competitors	282	1.386525	.779791	1	4
Consultants	283	1.367491	.7527277	1	4
R&D labs	283	1.194346	.5402618	1	4
Universities	283	1.229682	.6074907	1	4
Public research inst.	283	1.187279	.5295328	1	4
Publicfunds	281	1.227758	.6193992	1	4
Workforce qualific.	281	1.459075	.9019411	1	4
Access to knowhow	282	1.578014	.999615	1	4
R&D	281	1.352313	.765602	1	4
Production	281	1.359431	.8209261	1	4
Sales	281	1.612100	1.090083	1	4
Distribution networks	282	1.524823	1.019954	1	4
Customer proximity	282	1.521277	1.023518	1	4
East	292	.6438356	.4796867	0	1
West	292	.1815068	.3860993	0	1
South	292	.0205479	.1421087	0	1
Trondelag	292	.0890411	.285292	0	1
North	292	.0650685	.2470701	0	1

5.1.2 Network infrastructure service (SIS-N) firms:

Table 3 presents the results of the descriptive statistics for SIS-N firms. The share of SIS-N firms that engage in international cooperation (37,8%) is below the sample average. SIS-N firms have the highest share of innovative firms (49,3%). SIS-N firms have a lower share of firms with R&D facilities abroad (4,1%) than the sample average. The average firm size for this sectoral group is below the sample average, indicating the prevalence of small-medium sized enterprises in this sector. These firms consider network cost (1,68) to be the most important barrier, while geographical distance is the least important barrier of the three.

Customers, suppliers and other enterprises within the enterprise group seems to be the most important international cooperation partners, with their suppliers representing the most important cooperation partners and more important than the sample average. SIS-N firms indicate that sales and customer proximity are the most important motives for their international cooperation activities, and more important than the sample average. Furthermore SIS-N firms seem to view most of the other alternatives as more important than the sample average as well.

Table 3: Descriptive statistics for the sectoral group SIS-N

Sectoral group: Sis-N

Variable	Obs	Mean	Std. Deviation	Min	Max
International cooperation	74	.3783784	.4882932	0	1
Innovation	77	.4935065	.5032363	0	1
R&D abroad	73	.0410959	.1998858	0	1
Employment	79	4.139241	1.623025	0	7
Infrastructure	75	1.546667	.9904044	1	4
Networkcost	75	1.680000	1.067455	1	4
Distance	74	1.418919	.7764824	1	4
Enterprise group	76	1.631579	1.164384	1	4
Suppliers	77	1.857143	1.221671	1	4
Customers	76	1.763158	1.242239	1	4
Competitors	76	1,50	.9451631	1	4
Consultants	76	1.407895	.7861744	1	4
R&D labs	76	1.118421	.3639452	1	4
Universities	76	1.157895	.4336706	1	4
Public research inst.	76	1.118421	.3252529	1	4
Publicfunds	76	1.131579	.5251566	1	4
Workforce qualific.	76	1.381579	.7825958	1	4
Access to knowhow	77	1.714286	1.110443	1	4
R&D	76	1.473684	.9305724	1	4
Production	76	1.526316	1.025978	1	4
Sales	76	1.828947	1.258445	1	4
Distribution networks	76	1.671053	1.147614	1	4
Customer proximity	76	1.802632	1.275615	1	4
East	79	.6455696	.4813969	0	1
West	79	.164557	.3731494	0	1
South	79	.0379747	.1923564	0	1
Trondelag	79	.1139241	.3197492	0	1
North	79	.0379747	.1923564	0	1

5.1.3 Physical infrastructure service (SIS-P) firms:

Descriptive statistics for SIS-P is presented in table 4. The percentage of SIS-P firms who engage in international cooperation is 44,6% and represents the sectoral group with the highest propensity of international cooperation in the survey. This sector is characterized by traditional industries and is not highlighted in the literature as the most internationally oriented sector. Nevertheless, it is important to emphasize that the Norwegian SIS-P sector is important in the Norwegian economy. The high international cooperation propensity could be explained in terms of the traditional specialization pattern of the Norwegian economy, where industries providing physical infrastructure services have for a long time constituted a relatively strong position in the economic system. Many of these industries operate in activities related to Norway's comparative advantages, such as e.g. water transport industries with ties to research institutes and public funds. Many of the SIS-P industries have gained a stronger competitive position compared to foreign industries in the same sectoral group through the traditional specialization patterns in Norway and the potential spillovers (Fagerberg et. al., 2009); which could explain their competitive abilities on a global basis as well.

Meanwhile, the SIS-P have a distinctly lower share of firms that have introduced service innovation (29,5%) compared to the sample average, in line with the sectoral characteristics from the innovation literature. SIS-P firms further seem to have a higher propensity of R&D abroad (8%) than the sample average, which further underlines the peculiarities of this sector in Norway, as described above. The average number of employees is above the sample average.

Table 4: Descriptive statistics for the sectoral group SIS-P

Sectoral group: Sis-P

Variable	Obs	Mean	Std. Deviation	Min	Max
International cooperation	242	.446281	.4981362	0	1
Innovation	271	.295203	.4569778	0	1
R&D abroad	236	.0805085	.2726571	0	1
Employment	278	4.874101	1.386622	0	7
Infrastructure	270	1.914815	1.10934	1	4
Networkcost	272	1.996324	1.14453	1	4
Distance	270	1.703704	.987461	1	4
Enterprise group	269	1.587361	1.11167	1	4
Suppliers	268	1.764925	1.202666	1	4
Customers	269	1.713755	1.137815	1	4
Competitors	269	1.449814	.8651039	1	4
Consultants	269	1.401487	.7979437	1	4
R&D labs	269	1.256506	.6386235	1	4
Universities	269	1.29368	.695935	1	4
Public research inst.	268	1.238806	.5956032	1	4
Publicfunds	266	1.203008	.5861212	1	4
Workforce qualific.	267	1.400749	.8409622	1	4
Access to knowhow	267	1.670412	1.10194	1	4
R&D	267	1.430712	.9000171	1	4
Production	267	1.602996	1.086343	1	4
Sales	265	1.69434	1.138582	1	4
Distribution networks	267	1.606742	1.061471	1	4
Customer proximity	267	1.707865	1.162079	1	4
East	279	.6451613	.4793242	0	1
West	279	.1863799	.3901127	0	1
South	279	.0250896	.1566783	0	1
Trondelag	279	.0609319	.2396352	0	1
North	279	.078853	.2699936	0	1

SIS-P firms seem to view network costs (1,68) and physical infrastructure (1,54) as the most important barriers to their internationalization. SIS-P firms indicate that their suppliers (1,76) and customers (1,71) are the most important cooperation partners, and both are more important for them than the sample average. The suppliers are clearly most important for these firms. Customer proximity seems to be the most important motive, and above the sample average. Furthermore sales and access to know how seems to be important for SIS-P.

5.1.4 Personal goods and services (PGSs) firms:

The descriptive statistics for the sectoral group personal goods and services (PGSs) is presented in table 5. PGSs firms have the lowest international cooperation propensity (32,8%). This is in line with the literature, which characterizes this groups as a mainly domestic service group. PGSs group show a distinctly lower share of innovative firms (29,5%) than the sample average. Furthermore, these firms had a distinctly lower share of R&D facilities abroad (3,6%) than the sample average. These results are in line with the low innovative capabilities that the literature relates to this sectoral group and the common expectation of a close link between strong innovative capability and strong international competitiveness. The average amount of employees in this sectoral group is marginally above average, and it seems to be dominated by small-medium sized enterprises. PGSs firms seem to consider network cost (1,87) as the most important barrier. Furthermore, customers are viewed to be their most important cooperation partners, followed by their suppliers.

Table 5: Descriptive statistics for the sectoral group PGSs

Sectoral group: Pgs

Variable	Obs	Mean	Std. Deviation	Min	Max
International cooperation	140	.32857	.471380	0	1
Innovation	155	.2967742	.458317	0	1
R&D abroad	139	.0359712	.1868919	0	1
Employment	164	4.743902	1.596092	0	7
Infrastructure	155	1.812903	1.079845	1	4
Networkcost	155	1.877419	1.089117	1	4
Distance	155	1.703226	.9546482	1	4
Enterprise group	158	1.379747	.921143	1	4
Suppliers	158	1.582278	1.072025	1	4
Customers	158	1.632911	1.147439	1	4
Competitors	158	1.348101	.7813692	1	4
Consultants	158	1.259494	.6501384	1	4
R&D labs	158	1.183544	.5393864	1	4
Universities	158	1.183544	.5510685	1	4
Public research inst.	158	1.151899	.5193972	1	4
Publicfunds	158	1.151899	.5193972	1	4
Workforce qualific.	158	1.322785	.775985	1	4
Access to knowhow	158	1.443038	.9340936	1	4
R&D	158	1.278481	.6945962	1	4
Production	157	1.312102	.7750393	1	4
Sales	157	1.598726	1.120095	1	4
Distribution networks	157	1.420382	.913765	1	4
Customer proximity	157	1.477707	.9844039	1	4
East	164	.5426829	.4997006	0	1
West	164	.2195122	.4151839	0	1
South	164	.054878	.2284396	0	1
Trondelag	164	.0792683	.2709845	0	1
North	164	.1036585	.3057507	0	1

Sales and customer proximity seem to be the most important motives for PGSs firms, in line with domestic nature of this sector. This sector typically includes hotels and restaurants and their main international activities could arguably be directed towards increasing sales through attracting foreign customers to their domestic market.

Table 6: Coefficients of correlation between the explanatory variables and international cooperation

	Internat. cooperation	Innovation	R&D abroad	Employment	Infrastructure	Networkcost	Distance
Internat. cooperation	1.0000						
Innovation	0.3002	1.0000					
R&D abroad	0.2516	0.2171	1.0000				
Employment	-0.1212	-0.1233	-0.0191	1.0000			
Infrastructure	0.3328	0.1691	0.1591	-0.0613	1.0000		
Networkcost	0.3020	0.2467	0.1861	-0.0529	0.5619	1.0000	
Distance	0.1271	0.0786	0.1305	-0.0320	0.4499	0.5818	1.0000

Table 6 presents the correlations between the explanatory variables and international cooperation. The correlations indicate whether there is a methodological issue regarding multicollinearity between the explanatory variables. Most of the variables are positively correlated, nevertheless the coefficients are not too strong and we can go further with the probit regression analysis.

5.2 Probit regression analysis

Table 7 and 8 present the probit regressions with the explanatory variables and control variables. I have also computed interaction variable to be able to analyze the sectoral differences. Interaction variables are computed by multiplying each explanatory variable with each sectoral group, one at a time. Thereafter, to avoid the methodological challenge of possible collinearity between the interaction variables, these 24 interaction variables were included one by one in the regression analysis. The regression tables only include those interaction variables that increased the model fit and turned out to be significant or in the borderline, due to space limitations. The interaction variables are presented in the last part of table 7 and 8, combining the explanatory variables and the sectoral groups (e.g. Infrastructure AKP in table 7). By computing interaction variables, we can analyze the *relative* importance of the explanatory variables for each of the sectoral groups international cooperation activities, and thereby identify sectoral differences. The coefficients are presented in the table with the z value presented in parentheses indicating the significance level.

5.2.1 Innovation and firm specific characteristics

Hypothesis 1: The innovative capability in service firms is positively related to the international cooperation propensity.

The results from the probit regression analyses in table 7 and 8 clearly confirm the importance of innovation to international cooperation. We can see from regressions (1) – (8) in table 7 that the innovation variable is positive and significantly related to international cooperation. The interpretation of this result is that firms who report to have introduced a new or significantly improved service are more likely to engage in international cooperation. The indicator for R&D

abroad is also positive and significant. These two variables are also positive and significantly related to international innovation cooperation presented in table 8. These results provide empirical evidence in support of hypothesis 1. Innovative capabilities are confirmed to be positively related to international cooperation.

H4a: Innovation is a more important determinant of international cooperation for firms in the advanced-knowledge provider sector.

Hypothesis H4a expected innovation to be a more important determinant of international cooperation for firms in the AKP service sector. This interaction variable is not presented in table 7, as it did not show any significant relationship. Thereby, there is no support for hypothesis H4a related to international cooperation. Although not significant, innovation seems be a more relevant explanatory variable for AKP service firms related to international innovation cooperation. The interaction variable combining innovation and AKP in table 8 is positively related and highly close to the 10 percent significance level. Furthermore, innovation seems to be a less important explanatory variable of international innovation cooperation for SIS-N firms. This interaction variable is negative and significantly related to international innovation cooperation in table 8. The R&D abroad variable seems to be a more important explanatory variable of international innovation cooperation for SIS-P firms. This result furthers underlines the peculiar nature of this sector in Norway.

Hypothesis 2: We expect that smaller firms have a higher propensity to engage in international cooperation.

Table 7 shows that the employment variable is negative and significantly related to international cooperation in all the regression analysis, indicating that smaller firms are more likely to engage

in international cooperation. These empirical results support the second hypothesis. Meanwhile the firm size does not seem to be relevant for explaining the determinants of international innovation cooperation. This is to be expected as engaging in innovation cooperation projects arguably relies on the innovative capabilities in the firm, not firm size.

5.2.2 Barriers to internationalization

Hypothesis 3: Among the different barrier to internationalization we expect that physical infrastructure and network building costs are more important barriers for firms who engage in international cooperation. Whereas; geographical distance is expected to be a less important barrier for service firms.

The probit regression analyses (1)-(8) in table 7 show that infrastructure and network costs are both positive and significantly related to international cooperation, which provides support to the first part of hypothesis 3. Related to international innovation cooperation these two barriers are positive and significantly related as well. The interpretation of these results is that in general, firms who engage in international cooperation and international innovation cooperation view infrastructure and network costs as important barriers. Geographical distance is negative and significantly related to international cooperation in all the resgression analysis in table 7. This means that firms which engage in international cooperation view geographical distance as a less important barrier to internationalization, which supports the second part of hypothesis 3. Nevertheless, geographical distance does not seem to be a relevant explanatory variable for international innovation cooperation.

H4b: Physical infrastructure is a less important barrier for firms in the advanced-knowledge provider sector and a more important barrier for firms in the physical infrastructure service sector.

The interaction variable combining infrastructure and AKP is negative and significantly related to international cooperation in all the probit regression analyses in table 7, which means that physical infrastructure is a less important barrier for service firms in the sectoral group AKP compared. This result supports the first part of hypothesis H4b. The second part of this hypothesis expects physical infrastructure to be a more important barrier for SIS-P firms, and is not significantly confirmed. It is nevertheless important to emphasize that the interaction variable combining infrastructure and the SIS-P group in table 7 is positively related to international cooperation and distinctly close to the 10 per cent significance level.

H4c: Network building costs is a more important barrier for firms in the network infrastructure service sector.

The interaction variable combining network building costs and SIS-N is positive and significantly related to international cooperation, indicating that network building cost are a more important barrier for SIS-N firms. Hypothesis H4c is therefore supported, and this also applies for international innovation cooperation. Moreover, it seems that network building costs could also be a more important barrier for AKP firms international cooperations, with the interaction variable showing a positive relationship in table 7, although not significant.

H4d: The geographical distance is a less important barrier for advanced-knowledge provider firms.

Table 7 shows that the interaction variable combining geographical distance and the AKP group is negatively related to international cooperation, although not a significant results. Thereby, this result does not provide any empirical support to hypothesis H4d. AKP. Related to international innovation cooperation, geographical distance seems to be a more important barrier for SIS-N services.

5.2.3 Additional aspects: regional and sectoral control variables

Firms in the southern part of Norway turn out to be those who, relatively to the other regions, engage the most in international cooperation followed by the northern region. This pattern could be explained by the relatively low firm density in these areas, which could lead these firms to rely more on international cooperation. These patterns are not as relevant for the international innovation cooperation, as firms in the eastern part of Norway seem to be those who engage the most in international innovation cooperation. Firms located in the eastern part of Norway could have the advantage of having stronger innovative capabilities. This could be explained by the business structure in Norway, with a high density of Norwegian firms located in the eastern part of the country and knowledge spill-overs might occur to a larger extent in this area.

Regarding the sectoral dummies, the probit regression analyses imply that the lowest propensity to international cooperation is in the sectoral group PGSs, followed by AKP, SIS-N and SIS-P. Indicating that SIS-P firms engage the most in international cooperation, in line with the descriptive statistics. Related to international innovation cooperation, PGSs engage the least in

this type of innovative activities. These results further imply that SIS-P and AKP represent the sectors who engage the most in international innovation cooperation. These results are in line with the literature regarding the sectoral group APK, nevertheless the sectoral group SIS-P is not expected to be a relatively strong group in terms of innovative capacity, which further underlines the peculiarities of the Norwegian SIS-P group.

Table 7: Results of probit regression analysis.

Dependent variable: International cooperation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Innovation	.5682574 (4.92)***	.5728938 (4.95)***	.5813994 (5.01)***	.5691567 (4.91)***	.5698853 (4.93)***	.5702008 (4.93)***	.5736204 (4.95)***	.5673809 (4.91)***
R&D abroad	1.05017 (3.99)***	1.094974 (4.09)***	1.078175 (4.04)***	1.084851 (4.07)***	1.070674 (4.03)***	1.07629 (4.07)***	1.059526 (4.02)***	1.062637 (4.03)***
Employment	-.0774713 (-2.11)**	-.1250244 (-2.62)***	-.0372457 (-0.86)	-.0759072 (-2.05)**	-.0759644 (-2.07)**	-.0757698 (-2.06)**	-.0784551 (-2.13)**	-.0752719 (-2.04)**
Infrastructure	.3020421 (5.05)***	.3024872 (5.06)***	.3010105 (5.02)***	.4129583 (5.68)***	.243635 (3.47)***	.2967956 (4.95)***	.296997 (4.93)***	.2978022 (4.96)***
Networskcost	.2044287 (3.30)***	.2031419 (3.28)***	.1970942 (3.17)***	.2056281 (3.31)***	.2057752 (3.32)***	.2681908 (3.60)***	.1720076 (2.69)***	.2080223 (3.35)***
Distance	-.1666764 (-2.38)**	-.1699371 (-2.43)**	-.1613524 (-2.30)**	-.173843 (-2.48)**	-.166095 (-2.38)**	-.168712 (-2.41)**	-.1564405 (-2.22)**	-.1027668 (-1.26)
East	5.377243 (16.39)***	5.385141 (16.82)***	5.803214 (14.86)***	5.249463 (15.89)***	5,2655 (16.16)***	5.365729 (20.22)***	5.396465 (16.44)***	5.452591 (20.37)***
West	5.550622 (16.31)***	5.542975 (16.21)***	5.964576 (14.99)***	5.418661 (15.81)***	5.441287 (16.09)***	5.540067 (19.49)***	5.568071 (16.36)***	5.623427 (19.70)***
South	5.62463	5.639054 (12.75)***	6.031257 (12.33)***	5.545853	5.53338	5.646188 (13.71)***	5.66017	5.727874 (13.86)***
Trondelag	5.354396 (14.44)***	5.370637 (14.79)***	5.768691 (13.50)***	5.233481 (14.04)***	5.227624 (14.16)***	5.351626 (16.65)***	5.408139 (14.57)***	5.419982 (16.98)***
North	5.584357 (15.10)***	5.597239 (15.17)***	5.9979 (13.99)***	5.460513 (14.65)***	5.469487 (14.85)***	5.575623 (17.11)***	5.605061 (15.17)***	5.664314 (17.27)***
Akp	-6.359983 (-16.40)***	-6.701039	-6.967416 (-16.31)***	-5.897871 (-14.35)***	-6.150358 (-15.68)***	-6.162628	-6.317001 (-16.21)***	-6.248565
Pgs	-6.443924 (-16.68)***	-6.216235 (-15.91)***	-7.054193 (-16.13)***	-6.536432 (-16.61)***	-6.229275 (-15.92)***	-6.561799 (-25.92)***	-6.406414 (-16.52)***	-6.648226 (-25.72)***
Sis-n	-6.258668 (-15.83)***	-6.070047 (-15.69)***	-6.844359 (-15.52)***	-6.300473 (-15.79)***	-6.066855 (-15.24)***	-6.354409 (-23.62)***	-6.878387 (-14.15)***	-6.433239 (-23.88)***
Sis-p	-6.205862 (-15.99)***	-5.976995 (-15.60)***	-6.097783	-6.299242 (-15.96)***	-6.318312 (-15.51)***	-6.323734 (-26.44)***	-6.165699 (-15.81)***	-6.402736 (-26.60)***
Employment Akp		.1198805 (1.58)						
Employment Sisp			-.1485757 (-1.76)*					
Infrastructure Akp				-.2892256 (-2.81)***				
Infrastructure Sisp					.1649139 (1,58)			
Networkcost Akp						-.1452748 (-1.55)		
Networkcost Sisn							.3899406 (2.07)**	
Distance Akp								-.1682224 (-1.50)
Number of observations	690	690	690	690	690	690	690	690

Note: Significance levels: ***1%, **5%, *10%

Table 8: Results of probit regression analysis.

Dependent variable: International innovation cooperation

	(1)	(2)	(3)	(4)	(5)	(6)
Innovation	.8268978 (5.51)***	.9386376 (5.85)***	.6633443 (3.62)***	.8323977 (5.52)***	.8327101 (5.52)***	.8509249 (5.63)***
R&D abroad	1.544633 (5.71)***	1.54845 (5.66)***	1.539552 (5.66)***	2.095929 (4.66)***	1.563912 (5.79)***	1.581205 (5.81)***
Employment	.038194 (0.76)	.0408396 (0.81)	.0426898 (0.85)	.0428207 (0.85)	.0356839 (0.71)	.0485163 (0.96)
Infrastructure	.20151 (2.64)***	.2108587 (2.73)***	.2016016 (2.64)***	.1995881 (2.61)***	.1945523 (2.54)**	.1983782 (2.59)**
Networkcost	.1813572 (2.23)**	.1878282 (2.28)**	.1874808 (2.29)**	.1777386 (2.18)**	.1271785 (1.47)	.1864963 (2.28)**
Distance	-.1103533 (-1.15)	-.127634 (-1.31)	-.1195215 (-1.24)	-.1089662 (-1.14)	-.0906519 (-0.94)	-.1641623 (-1.65)*
East	4.386667 (9.38)***	4.281255 (10.92)***	4.427483 (11.49)***	4.427127 (9.67)***	4.445937 (8.31)***	4.281018 (9.12)***
West	4.297271 (8.88)***	4.232019 (10.52)***	4.361798 (10.90)***	4.326269 (9.10)***	4.338647 (7.78)***	4.16141 (8.55)***
South	4.371955	4.301059 (7.30)***	4.391101 (7.57)***	4.451544	4.446438 (6.39)***	4.288296
Trondelag	4.04615 (7.57)***	3.953167 (8.22)***	4.082949 (8.61)***	4.100131 (7.78)***	4.149875 (7.02)***	3.948092 (7.34)***
North	4.27478 (8.17)***	4.156658 (8.76)***	4.308321 (9.23)***	4.307556 (8.37)***	4.325873 (7.15)***	4.118413 (7.82)***
Akp	-6.387639 (-11.29)***	-6.361318 (-27.95)***	-6.613334 (-23.53)***	-6.479146 (-11.57)***	-6.329902 (-12.43)***	-6.235642 (-10.97)***
Pgs	-6.686277 (-11.54)***	-6.671778	-6.657531	-6.763066 (-11.78)***	-6.628076 (-12.54)***	-6.52448 (-11,22)***
Sis-n	-6.451452 (-11.13)***	-5.897984 (-15.87)***	-6.408993 (-23.08)***	-6.52295 (-11.36)***	-7.192862	-7.129525 (-10.12)***
Sis-p	-6.343822 (-11.09)***	-6.316916 (-28.11)***	-6.333153 (-28.81)***	-6.34345 (-11.20)***	-6.285101 (-12.33)***	-6.199863 (-10.79)***
Innovation Sisn		-.8938767 (-2.06)**				
Innovation Akp			.4780897 (1.53)			
R&D abroad Sisp				-1.02238 (-1.77)*		
Networkcost Sisn					.3564481 (1.87)*	
Distance Sisn						.5023649 (2.03)**
Number of observations	480	480	480	480	480	480

Note: Significance levels: ***1%, **5%, *10%

5.4 Summary of the econometric analysis

The main results are summarized in table 9, with the hypothesis presented as well.

Table 9: Summary of the econometric results

Hypothesis	Formulation	Results internat. coop.	Results innov. coop.
H1:	The innovative capability in service firms is positively related to the international cooperation propensity.	Confirmed	Confirmed
H2:	We expect that smaller firms have a higher propensity to engage in international cooperation.	Confirmed	Not supported
H3:	Among the different barrier to internationalization we expect that physical infrastructure and network building costs are more important barriers for firms who engage in international cooperation. Whereas; geographical distance is expected to be a less important barrier for service firms	Confirmed	First part confirmed Second part not supported
H4a:	Innovation is a more important determinant of international cooperation for firms in the advanced-knowledge provider sector.	Not supported	Not supported
H4b:	Physical infrastructure is a less important barrier for firms in the advanced-knowledge provider sector and a more important barrier for firms in the physical infrastructure service sector	First part confirmed Second part not supported	Not supported
H4c:	Network building costs is a more important barrier for firms in the network infrastructure service sector.	Confirmed	Confirmed
H4d:	The geographical distance is a less important barrier for advanced-knowledge provider firms.	Not supported	Not supported

The interview analysis will provide us with an in-depth perspective on the main explanatory factors and additional information related to the selected firms international cooperation activities. Furthermore, the interviews will elaborate on what types of service innovation the companies have introduced.

In the theoretical framework in chapter two the sectoral groups were presented and their different characteristics and capabilities were highlighted. The interviews add another aspect to the statistical results and provide supplementary insight to the sectoral differences regarding the firms international cooperation patterns.

6.0 Interview results and analysis

The sectoral groups are represented by the seven firm interviews and the main features from each sectoral group will be presented in the following. Each interview summary is attached to Appendix C.

6.1 Advanced-knowledge providers: Det Norske Veritas (DNV) and Csam Health AS

DNV offers a variety of services ranging from certifications and classifications to in-depth risk analysis, consultancy services, software solutions, laboratory tests and training. These services are related to their three global leading areas: Maritime and Oil and Gas, Energy and Sustainability and DNV Business Assurance. Csam Health is a software development firm which focuses exclusively on developing clinical software solutions for healthcare. DNV is a large global leader in their field while Csam Health is a small-medium sized software company operating with only a few foreign offices. Although highly different, these firms are at the forefront of their field and represent the most innovative sector in the economy. They engage in technologically and knowledge-intensive international cooperation activities and have several types of international cooperations. DNV is a distinctly larger firm and is part of more complex international cooperation networks than Csam Health. Nevertheless, international cooperation is extremely important for Csam Health as they have used these activities as a substitute to FDI regarding the Swedish market.

Furthermore, both companies emphasized that their technology cooperation partners were targeted due to their complementary competences and mutual benefits. These aspects are in line

with STP and technology cooperation literature which emphasized the potential benefits from external resources and know how (Santangelo, 2000; Hagedoorn, 1993; Archibugi and Michie, 1995; Baumol, 1992). As pointed out by DNV's External relations Advisor (DNV interview 10.07.2012) "we engage in these international cooperations to strengthen our company and to access new possibilities, technologies and innovation".

The types of innovations that have been introduced are developed in-house and in cooperation with their international cooperation partners and customers. As an example, DNV and two of their customers have recently engaged in the development, design and implementation of fuel cell technology in a supply ship. Innovation is one of the most important objectives for these firms' activities. Ad-hoc innovations and expertise-field innovations, which imply close interaction with their customers and identifying new needs and responding to them (Gallouj and Weinstein, 1997; Drejer, 2004), are vital for these firms and they engage in these types of innovations on a regular basis. The innovation activities are clearly important for these firms' international cooperation, in line with the statistical results.

The most important international cooperation partners for these firms are their customers, as they actively engage in innovative activities with them, supporting the statistical results. DNV also viewed research institutes to highly important partners, in line with the taxonomy that emphasized that research institutes and universities are one of AKP firms most important external sources. Csam Health also emphasizes that technology companies are important for them, as these companies develop the hardware that they use in their solutions; hence they have complementary competences. The main motives for these firms cooperations was to access new knowledge, access customers, attain further growth and to develop new technologies and innovations.

Both firms viewed different laws and regulations between countries as a barrier in their international activities, as well as business culture and accessing the best people in their field. Physical infrastructure was not mentioned by any of these firms, which could support the regression results which indicated that infrastructure is a less important barrier for AKP firms.

The causality between these firms international cooperations and FDI and exports are not clear cut. Both firms nevertheless emphasized that market analysis which identify potential opportunities abroad are used before investments are made. DNV might also identify investment possibilities in a foreign market due to a close international cooperation in that particular area forehand. DNV and Csam Health have a highly skilled workforce which is vital for their competitive position, due to the knowledge-intensive nature of their operations.

Main aspects from the represented AKP service firms:

Both firms engage in various types of international cooperation. These firms are highly innovative and develop innovations themselves on a regular basis. The key motive is to access knowledge cooperations. Users and research institutes are their main partners. Different laws and regulations is the most important barrier.

6.2 Network infrastructure service (SIS-N) firms: Telenor and IF

Telenor is one of the leading mobile operators in the world, while IF is a large insurance company. The interview with IF is mostly related to foreign car injuries, one of their most internationally oriented departments located in Norway. These firms engage actively in international cooperation. Telenor engages to a higher extent in highly technical international cooperations. Nevertheless, they both engage in international cooperation to access and utilize

knowledge and resources from their external partners and to enhance the service quality for their customers.

Innovation is important for these firms and new services are implemented on a regular basis. IF emphasizes the importance of improving and shaping their insurance services in close interaction with their customers. Moreover, several important internal organizational changes have been implemented since the company started. Furthermore, employee training is important in IF, as they use that to be able to improve their services. Telenor operates in a highly dynamic market and they have to be relatively innovative to be able to sustain a competitive position. Many of their international cooperations are also related to accessing new service products through ICT advanced technology companies, in line with the taxonomy. Telenor does not recruit enough human capital to develop new products themselves. They use resources to analyze and identify relevant competences in third parties instead, which could arguably be related to expertise-field innovation. Innovation was confirmed to be a less important explanatory factor related to international innovation cooperation for SIS-N firms in the regression analysis. The interviewed firms illustrate this aspect as they primarily buy their new services from external sources, rather than developing them themselves.

The most important international partners for these firms are other firms in the same service field with relevant expertise and knowledge. The most important motives for these firms were to generate more sales and improve their competitive position. Moreover they both emphasized that one of their main motives for their international cooperation was acquiring new knowledge and resources.

The most important barrier for their international activities was different laws and regulations between countries. Geographical distance was highlighted to be less important due to the ICT developments, supporting the statistical results. Telenor also views network cost to be an important barrier in technically challenging geographical landscapes, as this can lead to extremely high mobile network building costs. This aspect supports the statistical results which highlighted that that network building costs are a more important barrier for SIS-N firms.

The relationship between their FDI and international cooperation activities is not clear. Telenor mostly bases their FDI on market analysis. The ICT development has obviously been vital for these firms existence, especially for Telenor which is based on these developments. They also use novel ICT solutions in their daily operations, such as digital information systems, as both a knowledge distribution tool and as a cooperative tool.

Main aspects from the represented SIS-N firms:

These firms are relatively innovative and introduce new services which are bought from external sources. The key motive for their international cooperation is to increase their sales and to improve their service products and competitive position by accessing external knowledge and resources. Their main cooperation partners are other firms in their field of business. Different laws and regulations and network building cost are the most important internationalization barriers for these firms.

6.3 Physical infrastructure service (SIS-P) firms: H Strøm AS and Antra AS

H Strøm AS is a traditional transport company. In 2003 they started to utilize the railway for their transport services instead of the road. Antra AS is a wholesale trader which sells and

delivers equipment to ski resorts in Norway, Greenland and Denmark. These represent relatively small firms in terms of number of employees. Both firms engage in international cooperation, nevertheless, compared to the previous firms they engage in less complex and fewer alliances. Neither of the firms have foreign offices, and international cooperation is highly important for their operations. The managing director and owner of H Strøm As (H Strøm AS interview, 20.06.2012) stated that "It is extremely expensive to invest in the railway business. We therefore rather engage in international cooperations and rent locations". This aspect of international cooperation in a small firm such as H Strøm could be linked to the statistical results which showed the positive relationship between smaller firms and international cooperation. Small firms might be more dependent upon international cooperation than larger firms, as they often do not have the same amount of financial resources to cope with the risk of failing in foreign investments. The sectoral control variables also indicated that SIS-P firms engage the most in international cooperation. The SIS-P firms represented in the interviews are less involved in other modes of internationalization compared to the other firms, and might therefore be more dependent upon international cooperation.

These firms do not actively engage and search for service innovations on a regular basis. Antra As does not develop their own innovations, however they have introduced improved machines to their market by influencing their supplier to implement changes in the new machines. H Strøm AS's railway initiative in 2003 is their main innovation, which was partly financed by the Norwegian system Skattefunn. They identified potential commodity flows and a profitable new market, by using Swedish railway carriages which were transporting commodities across Europe (and sent empty in return) as a mean to supply the Norwegian commodity market. This type of

innovation could arguably be linked to expertise-field innovation, as new markets were opened and they created a competitive advantage based on knowledge and expertise (Drejer, 2004).

The most important international cooperation partners for both firms are their main suppliers, supporting the descriptive statistics. Their international cooperations are mainly motivated by enhancing their competitive position. Antra AS obtains that by accessing and buying technical equipment, in line with the taxonomy.

Different laws and regulations between countries is an important barriers for both firm, while H Strøm AS also views lack of sufficient physical infrastructure to be an important barrier for their internationalization. This was expected to be especially relevant for SIS-P firms, although the statistical results were not significant in the survey, this aspect from the interview is interesting to highlight. The use of ICT's is not advanced in these firms, compared to the other interviewed firms.

Main aspects from the represented SIS-P firms:

These firms are engaged in less complex and fewer international cooperations, nevertheless these firms are highly dependent upon them. Both firms have introduced improved service products to their markets, however they do not engage actively in innovative activities. The key motive is to enhance their competitive position. Their suppliers are their most important partner related to their international cooperations. Different laws and regulations and physical infrastructure are considered the most important barriers.

6.4 Personal goods and services (PGSs): Thon Hotels

Thon Hotels is one of Norway's largest hotel chains, with 60 hotels in Norway and seven hotels abroad. Their international cooperation activities are mainly related to a global network called Global Hotel Alliances (GHA), which includes approximately 600 hotels that operate worldwide. Their main motive for engaging in international cooperation is to access foreign customers. This is to be expected as the hotel is relatively domestic in nature and primarily relies on customers in the domestic market and the temporarily presence of foreign customers.

Thon Hotels has hired a team of IT engineers to analyze trends and to identify potential possibilities related to their hotel services. They have introduced a new service recently, which was a new service that enables their customers to use their mobile phone as room keys. This service was developed by the in-house IT engineers. It is arguably not a reflection upon the innovative capabilities in the hotel industry in general, as Thon Hotels has hired competences from an external and more advanced industry. As emphasized by the Managing Director (Thon Hotels interview, 20.09.2012), the average hotels in Norway "are often small hotels which use much less advanced technologies. They mainly offer simple wireless networks and standard use of computer systems". Although Thon Hotels have introduced many new technologically advanced services, they are recipients of advanced knowledge, rather than developer of such.

Their most important international cooperation partners are their customers, in line with the statistics. Thon Hotels' international cooperation activities have been important for their FDI, as they have used their international cooperations to investigate the market possibilities. On several occasions their international cooperations have led to their FDI.

The most important barrier for Thon Hotels is different laws and regulation between countries, especially related to varying import taxes. Moreover, the global economic situation and the relatively strong Norwegian currency has made it more difficult to attract foreign customers.

Main aspects from the represented PGSs firm:

Thon Hotels engages in international cooperation motivated by accessing foreign customers. They have introduced new services related to their hotel services, which were developed by in-house IT engineers. The innovative capability of the hotel industry in general is more limited. Their most important cooperation partners are their customers. Different laws and regulations is the most important barrier for them as well.

6.5 Main aspects from the interview analyses

The complexity and types of international cooperation differ between the sectoral groups. Large firms are more often engaged in more complex international coopoerations, nevertheless smaller firms seem to be more dependent upon their international cooperations as they do not engage as much in other modes of internationalization. Some of the smaller firms highlighted that their international cooperations were used as a substitute for FDI if possible.

All firms had introduced new services recently, however the innovative capabilities differs to a high degree. The AKP firms are clearly the most innovative as they develop service innovations internally on a regular basis and continuously have to deliver new services to their customers. Firms from the sectoral group SIS-N were relatively innovative, however they bought their service innovations from external sources. The innovation density was lower for the SIS-P and PGSs, and these firms were more supplier-driven.

In general the most important internationalization barrier was different laws and regulations. However there were sectoral differences here as well. Network building cost is one of the most important barriers for SIS-N firms. While physical infrastructure was one of the most important barriers for by SIS-P firms.

Thereby the results have supported many of the statistical results. Furthermore, the interviews supplemented the statistical analysis with a more in-depth understanding of the sectoral differences related to international cooperation patterns, and the relevance of the explanatory variables.

7.0 Summary and conclusions

The thesis has presented firm-level and sectoral-level analysis of international cooperation patterns among service firms in Norway. Previous studies of service internationalization have more often focused on the four GATS modes, FDI and export activities in particular. In this thesis the mode of international cooperation has been brought to the forefront of analysis. Due to the increasing importance of services in Norway it is important to investigate the areas which have attained less attention. The service innovation literature identifies the characteristics and peculiarities of many services, many of which make international cooperation especially relevant to analyze. It is therefore important to investigate international cooperation among service firms and what affects these activities. Services are not homogenous in nature and therefore it is important to include sectoral differences in the analysis, which has not been done in previous studies of service internationalization

The main research questions in the thesis are:

1. What are the main factors explaining the international cooperation patterns of service firms in Norway?
2. How do the determinants differ across the service sectors?

The theoretical framework is based on literature from innovation studies, economics and business studies. The main theoretical arguments imply that innovative capabilities, firm size and barriers to internationalization are highly important factors related to international cooperation activities. Regarding innovation, the main arguments are that it is important to have a strong innovative capability to be able to benefit from external new knowledge and resources that

becomes available through diverse international cooperations. Innovation could also be the objective for engaging in some types of strategic international cooperation.

Furthermore, the ICT development has led to new technological paradigms which are knowledge-intensive, hence firms depend upon good innovative capabilities to be able to gain benefits from the external knowledge- and information pool. Service specific characteristics and innovation concepts have also been presented as a way of emphasizing the variety of innovative activities that can be identified in services. It is important to emphasize other less technologically oriented innovative activities.

The theoretical arguments also imply that firm size could be a relevant factor related to international cooperation. Small firms might engage more in international cooperation as these firms have less internal resources and depend more upon external relations. Other forms of foreign investment, such as FDI include higher risks and high initial costs, which smaller firms are more vulnerable towards. The barriers to internationalization for service firms, which are included in the statistical analysis, are physical infrastructure, network costs and distance. Barriers to internationalization are important to include in order to identify the importance of these challenges for Norwegian service firms who engage in international cooperation.

Several contributions from studies of innovation have led to a relatively new taxonomy of the sectoral groups in the service sector, which enables a sectoral analysis to be included as well. The four sectoral groups are argued to differ relating to their innovative capacities, function in the economic system and external sources. Hence, it is expected that the importance of the explanatory variables will differ between these sectoral groups.

In order to answer the research questions in light of the theoretical framework both statistical analysis and interviews were conducted. The data set, based on the survey conducted at NUPI, provided empirical material which could address these research questions. The two methods complement each other, and the interviews were conducted to supplement the survey in terms of e.g. the types of international cooperation, types of innovation and other in-depth insight from the firms.

7.1 Summary of the main results

The statistical analysis clearly showed that innovative capacity is importan related to international cooperation. Innovative firms are more likely to engage in international cooperation, confirming that innovation is one of the determinants of innovation as indicated by the literature. The interviews confirmed the importance of innovation for their international cooperation and provided more insights in terms of what types of innovations the firms had introduced recently and whether they had developed the innovations themselves. In general, new or improved services were introduced by all the firms, nevertheless the innovation density and types of innovations differed. The interviewed AKP firms represented the most innovative firms. They continuously developed technologically advanced new services themselves as well as related to international cooperation projects. These aspects underline the statistical result which confirmed that innovation seems to be a more important determinant of international innovation cooperation for firms in the AKP service sector.

The interviewed SIS-N firms were relatively innovative, however they bought their service innovations from external sources. Furthermore, the interviews illustrated a lower innovation

density in the SIS-P and PGSs firms, in line with the descriptive statistics and these firms were more supplier-driven.

The analysis conducted in the thesis implies that smaller firms are more likely to engage in international cooperation. The number of employees in the interviewed firms ranged from 15 to several thousand. International cooperation was important to all seven firms, however the interview analysis identified a pattern in terms of other internationalization modes. The smaller firms were engaged in only a few, or none, other modes of internationalization. Some of the smaller firms indicated that international cooperation was used as a substitute for FDI or to access potential new foreign markets in the future. Thereby, international cooperation could be more important for smaller firms as they are not as active in other modes of internationalization compared to the large firms, such as DNV and Telenor. Firm size did not seem to be relevant for international innovation cooperation. This is to be expected as engaging in innovation cooperation projects arguably relies on the innovative capabilities in the firm, regardless of firm size.

Infrastructure and network building cost were confirmed by the probit regression analysis as the two most important barriers for firms who engage in international cooperation, while geographical distance was confirmed to be a less important barrier. The ICT advancements in recent decades could arguably explain the why geographical distance is a relatively less important barrier for international cooperation. Many service products are not as restricted by geographical distance due to new possibilities which have emerged through ICTs.

Regarding the sectoral differences related to the barriers, geographical distance was not confirmed to be a relatively less important barrier for advanced-knowledge provider firms. Due

to the strong technological capabilities in this group and their advanced use and development of novel ICTs, geographical distance was expected to be a less important barrier for this sectoral group compared to the others.

Physical infrastructure was confirmed to be a relatively less important barrier for advanced-knowledge provider service firms, which also could be linked to their more advanced use of ICTs. Physical infrastructure was not confirmed to a more important barrier for physical infrastructure service firms. These firms depend upon the physical infrastructure to deliver their services, and were therefore expected to view this as a more important barrier than the other sectoral groups. In the interview Antra AS, representing a railway transport company, emphasized that lack of sufficient infrastructure was hindering them from increasing the benefits from their international cooperations.

Furthermore, network building costs were confirmed to be a more important barrier for the sectoral group SIS-N. The interview with Telenor supported this result as building mobile networks abroad could become extremely expensive.

In general, all firm interviews emphasized that different laws and regulations were hindering their internationalization activities, which was not captured by the survey. Although, we can not generalize on this matter it is nevertheless a common aspect for all the interviews and relevant to emphasize.

7.2 General implications

There are potential implications which can be drawn from the results and analysis. The main determinants and sectoral differences which were identified in the thesis are not definite. The survey provided a data set from a specific time period and patterns and relationships might differ in the future. However the interviews provided in-depth insights towards present international cooperation activities and patterns. The thesis contributes to the literature by addressing other relevant channels of service internationalization and by illustrating sectoral differences. So far few studies have been conducted on the topic of international cooperation in services, and few studies address the factors that may explain this type of international activities. Innovative capabilities, firm size and the identified barriers of international cooperation are relevant for Norwegian service firms international cooperation activities in different ways. Furthermore, the interviews clearly emphasized that international cooperation enhanced the interviewed firms competitive abilities and was an important channel of service internationalization. Policy adjustments towards developing incubator platforms for internationally active firms in each sectoral group might lead to beneficial knowledge-spillovers. Firms of all sizes with complementary competences would have access to a mutual platform to further improve their international and domestic performance. In particular this could enhance the firms competitive position and contribute to further economic development.

Further research could build on the findings in the thesis and investigate further what service firms could do to succeed more through their international cooperations. It would also be interesting to analyze international cooperation patterns and determinants by using panel- data in future research.

References

Adlung, R. & Mattoo, A. (2008). The GATS. In A. Mattoo, R. M. Stern & G. Zanini (Eds.), *A Handbook Of International Trade In Services* (pp. 48-83). Oxford: Oxford University Press

Archibugi, D. & Michie, J. (1995). The globalization of technology: a new taxonomy. *Cambridge Journal of Economics, 19*, 121-140

Arvanitis, S. (2009). How Do Different Motives for R&D Cooperation Affect Firm Performance? An Analysis Based on Swiss Micro Data, *KOF Working Papers No. 233*. Available from: *http://dx.doi.org/10.2139/ssrn.1436425*

Axelsson, B. & Easton, G. (Eds.). (1992) *Industrial Networks: A New View of Reality.* London: Routledge

Baumol, W.J. (1992). Horizontal collusion and innovation. *The Economic Journal*, 102 (410), 129-137

Castellacci F (2008). Technological paradigms, regimes and trajectories: manufacturing and service industries in a new taxonomy of sectoral patterns of innovation. *Research Policy*, 37, 978–994.

Castellacci, F. (2010) The Internationalization of Firms in the Service Industries: Channels, Determinants and Sectoral Patterns, *Technological Forecasting and Social Change*, 3, 500-513

Castellacci, F. (2012). Firms' internationalization in the service industries. Evidence for Norway, in H. Hveem & C. H. Knutsen (Eds.), *Governence and Knowledge. The politics of foreign investments, technology and ideas* (pp. 199-217). Routledge: Abingdon

Coviello, N. & Munro, H. (1995) Growing the entrepreneurial firm: networking for international market development. *European Journal of Marketing*, 29, 49-51

Coviello, N. & Munro, H. (1997). Network Relationships and the Internationalisation Process of Small Software Firms. *lnternational Business Review*, 6 (4), 361-386

Drejer, I. (2004). Identifying innovation in surveys of services: a Schumpeterian perspective. *Research Policy*, 33, 551–562.

Ernst, D., Fagerber, J. & Hildrum, J. (2002). Do Global Production Networks and Digital Information Systems Make Knowledge Spatially Fluid? *Economics Series*, East-West Center Working Paper No. 43. Available from: http://scholarspace.manoa.hawaii.edu/bitstream/handle/10125/3674/ECONwp043.pdf?sequence=1

Fagerberg, J. (2003) Schumpeter and the revival of evolutionary economics: an appraisal of the literature. *Journal of Evolutionary Economics* 13: 125-159

Fagerberg, J., Movery, D.C., & Verspagen, B. (2008) Innovation-systems, Path-dependency and Policy: The Co-evolution of Science, Technology and Innovation Policy and Industrial Structure in a Small, Resource-based Economy. TIK Working Papers on Innovation Studies No. 20080624. Available from: http://hdl.handle.net/1853/39648

Fagerberg, J., Movery, D.C., & Verspagen, B. (2009). Introduction: Innovation in Norway. In J. Fagerberg, D. C. Movery & B. Verspagen (Eds.), *Innovation, Path dependency, and Policy* (pp. 1-29). New York: Oxford University Press

Gallouj, F. &Weinstein, O. (1997). Innovation in services. *Research Policy, 26*, 537–556

Hagedoorn, J. (1993). Understanding the rationale of strategic technology partnering: interorganizational modes of cooperation and sectoral differences. *Strategic Management Journal 14*, pp. 371-385

Hara, G. & Kanai, T. (1994). Entrepreneurial networks across oceans to promote international strategic alliances for small businesses. *Journal of Business Venturing*, 9, 489-507

Henten, A. & Vad, T. (2002) Services internationalization: characteristics, potentials and barriers of Danish services firms. In M. Miozzo & I. Miles (Eds.), Internationalization. Technology and Services (pp. 184-205). Cheltenham: Edward Elgar Publishing Limited

Hildrum, J. & Fagerberg, J. (2002). Mobility of Knowledge, ICT and growth. Paper to be presented at DRUID 2002 Conference, June 6-8, Copenhagen. Available from: http://www.druid.dk/conferences/summer2002/Papers/FAGERBERG_HILDRUM.pdf

Kaufmann, F. (1995). Internationalization via co-operation: strategies of SME. *International Small Business Journal,* 13, 27-33

Korhonen, H., Luostarinen, R. & Welch, L. (1996). lnternationalisation of SMEs: Inward-Outward Patterns and Government Policy. *Management International Review*, 36 (4), 315-329

Miles, I. (2005). Innovation in services. In J. Fagerberg, D. C. Mowery & R. R. Nelson (Eds.), *The Oxford Handbook of Innovation* (pp. 433-458). Oxford: Oxford University Press

Miozzo, M. & Soete, L. (2001). Internationalization of services: a technological perspective. *Technological Forecasting and Social Change,* 67 (2), 159–185

Narula, R. (1999). Explaining Strategic R&D Alliances by European Firms'. *Journal of Common Market Studies, 37*, 711–723

Narula, R. & Hagedoorn, J. (1999). Innovating Through Strategic Alliances: Moving Towards International Partnerships and Contractual Agreements. *Technovation*, 19, 283–294

OECD. (2005). Growth in Services - Fostering Employment, Productivity and Innovation. *OECD Digital Economy Papers*, 94. OECD Publishing. Available from: http://dx.doi.org/10.1787/232370436752

Pavitt, K. (1984). Sectoral patterns of technical change: towards a taxonomy and a theory. *Research Policy*, 13, 343–373

Santangelor *G.D.*(2000). Corporate strategic technological partnership in the European information and communication technology industry. *Research Policy, 29*, 1015–1031

Sharma, D. D. & Johanson, J. (1987). Technical consultancy in internationalisation. *International Marketing Review*, 4 (4), 20-29

Sharma, D. (1993) Introduction: industrial networks in marketing. In S. T. Cavusgil and D. Sharma (Eds.), *Advances in International Marketing* (vol. 5 pp. 1-9). Greenwich: JAI Press

Statistisk Sentralbyrå. (2007). Arbeidstiden redusert med en tredel etter krigen. Available from: http://www.ssb.no/vis/magasinet/analyse/art-2007-03-02-01.html

Interview details:

Antra AS interview (14.06.2012). Fredrik Lien, Managing Director

Csam Health AS interview (02.08.2012). Glenn Kenneth Bruun, Director for Innovation and Strategy

DNV interview (10.07.2012). Jannicke Witsøe, External Relations Advisor

H Strøm AS interview (20.06.2012). Lars Lien, Managing director and owner

IF interview (18.06.2012). Jens Gravdal, Nordic Executive for Foreign Claims in car injuries

Telenor interview (28.06.2012). Dag Ragnar Larsen, Research Leader Telenor Group and Project Leader Canal Digital

Thon Hotels interview (20.09.2012). Morten Thorvaldsen, Managing Director

Appendix A: Survey Questionnaire

Question 1
Is the enterprise part of a group?

Yes ☐
No ☐

Question 2
Is the enterprise a parent company or a subsidiary?
Please cross the suitable alternatives.

Parent company ☐
Subsidiary ☐

Question 3
In which country is the headquarters?

Question 4
How many employees, including part-time, did the enterprise have in 2006?
(Pick an alternative: 0-9, 10-19, 20-49, 50-99, 100-249, 250-499, 500 or more)

If your enterprise is a Norwegian parent company with subsidiaries in Norway or abroad, the answers should refer to the group as a whole. If the enterprise is a subsidiary company of a foreign group, the answers should refer only to the Norwegian firm (and subsidiaries of this Norwegian firm). Unless a specific period or year is stated, we would like you to consider your enterprises situation now when answering

International Sales

By **international sales** we mean the total of the enterprise's sales of services abroad sold by means of one or more of the following channels: exports; licensing agreements or franchise; sales by temporary presence of the enterprise's personnel abroad; sales by the enterprise's affiliates, subsidiaries, or branches in foreign markets. International sales can also be sales where a non-Norwegian customer who is based abroad consumes the service in Norway.

Question 5

Did your enterprise have any international sales in 2006?

Yes ☐
No ☐

If the answer to question 5 is no, go to question 9[1]

Question 6

Please indicate the percentage of your total turnover that came from international sales in 2006.

Below 20%[2] ☐
20%- up to 40% ☐
40%-up to 60% ☐
60%-up to 80% ☐
80%- up to 100% ☐

[1] This comment and subsequent comments that guides the respondent to skip certain questions, was/were expressed explicitly only in the web-based questionnaire, but a selection of questions based on the respondents' answers was made also in the phone-based data-collection.

[2] Phrasing in the Word-based questionnaire for this alternative was "0%- up to 20%"

Question 7[3]

When considering your enterprise's customers **abroad**, how important are the following types of clients? Please cross one box each line.

	High importance	Medium importance	Low importance	Not relevant
Production companies[4]	☐	☐	☐	☐
Trading companies[5]	☐	☐	☐	☐
Private customers(Households etc)[6]	☐	☐	☐	☐
Public sector[7]	☐	☐	☐	☐

[3] In earlier questionnaire this was Question 9 (after the section that is question 8- question 11 here). Questions 8-11 here had the numbers 5-8.

[4] In earlier questionnaires this was two separate alternatives: "Multinational production companies " and "Local production companies"

[5] In earlier questionnaires this was two separate alternatives, "Distribution companies" and "Retail enterprises"

[6] In earlier questionnaires this was phrased as "Consumers, households"

[7] This option was not included earlier version but was added in the web-based questionnaire.

Question 8

How important are the different channels listed below for your enterprise's total international sales. Please cross one box each line

	High importance		Medium importance		Low importance		Not used
Exports	☐		☐		☐		☐
Temporary presence of the enterprise's personnel abroad.	☐		☐		☐		☐
Licensing agreements or franchises[8]		☐		☐		☐		☐
Own company abroad	☐		☐		☐		☐
Joint venture	☐		☐		☐		☐
Foreign customer consumes the services in Norway[9]	☐		☐		☐		☐

A **service innovation** is the market introduction of a **new** service or a **significantly** improved service with respect to its capabilities, such as quality, user friendliness, software or subsystems. The innovation must be new to your enterprise, but it does not need to be new to your market. It does not matter if the innovation was originally developed by your enterprise or by other enterprises.

Question 9

During the period 2004-2006 did your enterprise introduce new or significantly improved services?
Please cross one box.

Yes ☐
No ☐

If the answer to question 9 is no, go to question 12

[8] In earlier questionnaires this was phrased as "Licensing agreements". In the web-based survey (and e-mails sent to hotels & restaurants in the phone survey) "or franchises" was added.

[9] In earlier questionnaires this was phrased as "Foreign customer is present in Norway for sale/production/delivery (e.g. tourists)

Question 10

Consider now these **new services**. How important were the alternatives listed below for the international commercialization of these new services? Please cross one box each line.

	High importance	Medium importance	Low importance	Not used
Exports	☐	☐	☐	☐
Temporary presence of the enterprise's personnel abroad.	☐	☐	☐	☐
Licensing agreements or franchises[10]	☐	☐	☐	☐
Own company abroad	☐	☐	☐	☐
Joint venture	☐	☐	☐	☐
Foreign customers consume the service in Norway[11]	☐	☐	☐	☐

Question 11

Where were these **new services** sold?
Please indicate the importance of each of the regions listed below. Please cross one box each line.

	High importance	Medium importance	Low importance	Not relevant
Nordic countries except Norway	☐	☐	☐	☐
Western European countries except Nordic countries	☐	☐	☐	☐
Eastern European countries	☐	☐	☐	☐
North America (USA and Canada)	☐	☐	☐	☐
Latin America	☐	☐	☐	☐
Asia	☐	☐	☐	☐
Africa	☐	☐	☐	☐
Oceania	☐	☐	☐	☐

[10] See footnote 5

[11] See footnote 6

Barriers to internationalization

Question 12

What are the main barriers to the internationalization of your company? Please indicate the importance of following factors. Please cross only one box for each line

	High importance	Medium importance	Low importance	Not relevant
Regulations concerning presence of personnel (e.g. working permission, licences to operate within a profession, residence permits or visas)	☐	☐	☐	☐
Regulations on foreign business activity (e.g restrictions on sales, marketing, product standards, foreign investments etc)	☐	☐	☐	☐
Infrastructure (Communication, Transport or distribution channels)	☐	☐	☐	☐
Language barriers or cultural barriers	☐	☐	☐	☐
Discrimination vis-à-vis national enterprises	☐	☐	☐	☐
Inadequate protection of intellectual property rights	☐	☐	☐	☐
Costs of building up a contact network abroad	☐	☐	☐	☐
Lack of qualified workers	☐	☐	☐	☐
Lack of risk capital	☐	☐	☐	☐
Difficult to deliver service across distance	☐	☐	☐	☐

International co-operation

By **international co-operation** we mean active participation on one or more activities with other enterprises or non-commercial institutions that are non-Norwegian and that are located abroad. Exclude pure contracting out of work with no active co-operation.

Question 13[12]

Did the enterprises have international co-operation during 2004-2006?

Yes ☐

No ☐

If the answer to question 13 is no, go to question 20

Question 14

For each of the alternatives listed, please indicate the importance of this type of international co-operation partner during the period 2004-2006. Please cross one box each line.

	High importance	Medium importance	Low importance	Not used
Other enterprises within your enterprise group	☐	☐	☐	☐
Suppliers of equipment, materials, services, or software	☐	☐	☐	☐
Clients or customers	☐	☐	☐	☐
Competitors or other enterprises in your industry	☐	☐	☐	☐
Consultants, consultancy enterprises	☐	☐	☐	☐
Commercial labs, or private R&D institutes	☐	☐	☐	☐
Universities or other higher education institutions	☐	☐	☐	☐
Public research institutes	☐	☐	☐	☐

[12] Question not included in earlier questionnaires

Question 15

Where was(were) your international co-operation partner(s) located? Please indicate the importance of each of the listed regions. Please cross one box each line.

	High importance	Medium importance	Low importance	Not relevant
Nordic countries except Norway	☐	☐	☐	☐
Western European countries except Nordic countries	☐	☐	☐	☐
Eastern European countries	☐	☐	☐	☐
North America (USA and Canada)	☐	☐	☐	☐
Latin America	☐	☐	☐	☐
Asia	☐	☐	☐	☐
Africa	☐	☐	☐	☐
Oceania	☐	☐	☐	☐

Question 16

There can be various reasons for engaging in international co-operation. What was the purpose of your enterprise's international co-operation during the period 2004-2006? Please indicate the importance of each of the alternatives listed. Please cross one box each line.

	High importance	Medium importance	Low importance	Not relevant
Public co-financing	☐	☐	☐	☐
Adding to the qualifications of the workforce	☐	☐	☐	☐
Access to know-how	☐	☐	☐	☐
Research and development	☐	☐	☐	☐
Production	☐	☐	☐	☐
Sales[13]	☐	☐	☐	☐
Access to distribution networks	☐	☐	☐	☐
Proximity to customers	☐	☐	☐	☐

Other, please specify:_____

[13] There were two alternatives in the earlier version "*Sales*" and "*International sales*", but these two were put together in the web-based questionnaire.

International innovation co-operation

Innovation co-operation is the active collaboration with other enterprises or non-commercial institutions on R&D and other innovation activities, i.e. on activities that are related to the development of new services, new products or new processes. Exclude pure contracting out of work with no active co-operation.

Question 17[14]

Did the enterprise have innovation co-operation with other international co-operation partners during 2004-2006?

Yes ☐

No ☐

If the answer to question 17 is no, go to question 20

Question 18

How important were each of the listed types of co-operation partners in your enterprise's international innovation co-operation during 2004-2006. Please cross one box each line.

	High importance	Medium importance	Low importance	Not used
Other enterprises within your enterprise group	☐	☐	☐	☐
Suppliers of equipment, materials, services, or software	☐	☐	☐	☐
Clients or customers	☐	☐	☐	☐
Competitors or other enterprises in your industry	☐	☐	☐	☐
Consultants, consultancy enterprises	☐	☐	☐	☐
Commercial labs, or private R&D institutes	☐	☐	☐	☐
Universities or other higher education institutions	☐	☐	☐	☐
Public research institutes	☐	☐	☐	☐

[14] Question not included in earlier questionnaires

Question 19

Where was(were) your international innovation co-operation partner(s) located? Please indicate the importance of each of the listed regions. Please cross one box each line.

	High importance	Medium importance	Low importance	Not relevant
Nordic countries except Norway	☐	☐	☐	☐
Western European countries except Nordic countries	☐	☐	☐	☐
Eastern European countries	☐	☐	☐	☐
North America (USA and Canada)	☐	☐	☐	☐
Latin America	☐	☐	☐	☐
Asia	☐	☐	☐	☐
Africa	☐	☐	☐	☐
Oceania	☐	☐	☐	☐

R&D(research and development) performed by your enterprise abroad

Question 20

Does your enterprise have R&D facilities[15] abroad?

Yes ☐
No ☐

If the answer to question 20 is no, go to question 23

Question 21

Where are your enterprise's R&D facilities located? Please indicate the importance of each of the listed regions. Please cross one box each line.

	High importance	Medium importance		Low importance	Not relevant
Nordic countries except Norway	☐	☐		☐	☐
Western European countries except Nordic countries	☐	☐		☐	☐
Eastern European countries	☐	☐		☐	☐
North America (USA and Canada)	☐	☐		☐	☐
Latin America	☐	☐		☐	☐
Asia	☐	☐		☐	☐
Africa	☐	☐		☐	☐
Oceania	☐	☐		☐	☐

[15] The Norwegian word used was "virksomhet" (≈activities, operations)

Question 22

What was the main reason(s) for the enterprise to locate R&D facilities abroad?
Please indicate the importance of each of the alternatives listed. Please cross one box each line.

	High importance	Medium importance	Low importance	Not relevant
Proximity to customers	☐	☐	☐	☐
Proximity to suppliers	☐	☐	☐	☐
Proximity to universities/ research centres	☐	☐	☐	☐
Proximity to advanced research/industrial clusters	☐	☐	☐	☐
Unfavorable legislation in Norway	☐	☐	☐	☐
Favorable legislation abroad	☐	☐	☐	☐
Low labor costs	☐	☐	☐	☐
Access to highly qualified workers	☐	☐	☐	☐

Other, please specify:_____

Question 23[16]

What was the enterprises total turnover in 2006? Answer in NOK

(Pick an alternative)

- ☐ Below 20 million
- ☐ 20 million - below 30 million
- ☐ 30 million - below 40 million
- ☐ 40 million - below 50 million
- ☐ 50 million - below 75 million
- ☐ 75 million - below 100 million
- ☐ 100 million - below 250 million
- ☐ 250 million - below 500 million
- ☐ 500 million - below 750 million
- ☐ 750 million - below 1 billion
- ☐ More than 1 billion

[16] In the earlier version of the question was open

Question 24

How has the enterprises total turnover developed the last 5 years?

- Strong increase ☐
- Slight increase ☐
- More or less unchanged ☐
- Slight decrease ☐
- Strong decrease ☐

Question 25[17]

Which function within the enterprise does the respondent have?

- CEO or similar ☐
- Economy ☐
- Information and communication ☐
- International sales/International department or similar ☐
- Technology/ Research/Development or similar ☐
- Other ☐

[17] In the earlier version of the question was open

Appendix B: Interview guide

Interview guide

Question 1. What is the nature of the company?

Question 2. What types of international cooperation do/have you engaged in? Has the firm introduced any new services the past years, and what type of innovation is it?

Question 3. Who are your main external sources?

Question 4. What are your main motives for your international cooperations?

Question 5. Do you consider your international cooperations to be organizational strategies to enable future improvements of your products? Are you part of a network?

Question 6. Do you have any export activities or FDI? If not; is there a specific reason? Do you consider international cooperation as an influential factor related to these other international activities? If yes; which channel leads to the other?

Question 7. What do you consider to be the most important barrier for your international cooperations?

Additional questions**:**

How does the company use and apply ICTs, and how would you explain the importance of these technologies for your company?

Are domestic cooperations more important for the company?

Appendix C: Interview summaries

Interview summary – Det Norske Veritas (DNV)

Det Norske Veritas represent the sectoral group advanced-knowledge provider services.

The interviewer is Jannicke Witsø, employed as an External Relations Advisor.

Question 1. DNV is a Norwegian independent foundation which implies no shareholders, and was established in 1864. It is evident for our company to be at the forefront of all of our services. We have to be able to offer our customers state of the art products and services. DNV has 300 offices in 100 countries with 10400 employees, the Headquarter and Executive Group is in Norway. DNV's turnover in 2011 was 10,156 billion NOK. We are divided into three companies with globally leading positions; these are DNV Maritime and Oil and Gas which is our initial area of expertise, DNV KEMA Energy and Sustainability and DNV Business Assurance. DNVs objective is constantly to identify and access new technologies, markets and opportunities which are in line with our main purpose, which is to secure life, property and the environment. The structure of our company, as a foundation, implies that our internal culture is vital for our company's growth and competitiveness. We invest 6% of our revenue in R&D and innovation; the remaining revenues are invested in the company and our employees for further growth. Our company offers a variety of services to our customers, ranging from certifications and classifications to in-depth risk analysis, consultancy services, software solutions, laboratory tests and training. One of our primary goals is to identify future development trends and potential areas of interest hence the company structure is important, as it enables us to have a more long-term perspective in our work and investments. Furthermore it is highly important for us to further improve the already high competence level for our employees. Therefore we invest in a vast amount of training and courses, as well as employee mobility between areas of expertise.

We strongly believe that it is profitable that our employees get insight in several fields, which increases their competence level and can further improve their work in each employee's area of expertise.

Question 2. We engage in international cooperation in extremely many ways, as we have become a highly global and knowledge intensive company. Our international cooperations differs between our business areas and offices all over the world. I will exemplify with our "Class company", which is DNV Maritime and Oil and Gas and our longest tradition of expertise. We have close cooperations with several flag states (maritime authorities) worldwide. Today we have been delegated authority by 130 flag states to carry out statutory services, to ensure that vessels meet their specific requirements. We also have similar activities in our other expertise fields. In more general terms we work closely with research institutes and universities. We work with universities primarily in our interest fields, because many of these educate our future leaders. DNV engages with universities abroad as well as in Norway. Research institutes worldwide are important for our international cooperations, especially in countries which are strategically important to us. Chinese research institutes represent one of our close international cooperations. We also engage in international cooperations through joint ventures, in which we see complementary interests and thereby we built up a new entity. Joint ventures or other types of international cooperations are our way to protect ourselves and our competitive ability in a highly dynamic and competitive environment. In addition to these more market-driven cooperations we also engage in strategic cooperations in international policy arenas, such as the World Business Council for Sustainable Development and the UN Global Compact. We want to be a contributor in shaping the framework for the environments that we operate in. Therefore we identify certain arenas which we consider to be important for us to engage in, in terms of international organizations.

DNV has developed several new innovations recently, which is one of our most important objectives. The following are examples of research and innovation projects related to our international cooperations. Viking Lady is a research- cooperation between us, Eidsvik Offshore and Wartsile about the development, design and implementation of fuel cell technology in a supply ship. We have a Joint Industry Project with, among others, BP, ENI, Ruhrgas, Gassco,

Shell and the Norwegian Petroleumstilsynet in which the objective is to enhance the design of CO2 pipelines. DNV also cooperates with Korea National Oil Corporation (KNOC), a state-run oil company in South Korea, on environment, health, safety and quality management system enhancement. Furthermore we engage in ad hoc innovations through our knowledge intensive consultancy services.

Question 3. It is not easy to identify who our most important external sources are; this is a highly complex aspect for DNV due to the decentralization and global character of our company. DNV has several geographical centers abroad, e.g. Singapore is the geographical center for Asia, Houston for North-America, South-America and the southern part of Africa, London for Europe and North-Africa, Oslo for Norway, Finland and Russia. We have different strategies and framework in every market we operate in, therefore it is not easy to give an unequivocal answer. DNV is a highly complex company which offers services in a variety of markets and arenas. In terms of DNV Maritime and Oil and Gas, which represents our area of long traditions and expertise, we might highlight ship-owners, shipbuilding yards, independent self-employed and the maritime industry in general as well as maritime research institutes. We most often do not engage in one time agreements, these are strategic cooperations from our point of view. The motivation for us is to establish close relations to our customers, regardless whether they are firms, institutes or national authorities. Our customers are our most important cooperative partners, and to be able to offer them the best service available we therefore connect ourselves to the leading researchers in e.g. the maritime field. We engage in R&D and innovation as a mean to be able to deliver the best possible services and products to our customers. The customers also have in-depth insight which can contribute to a better understanding of their challenges and together identify potential future demands. Throughout our global fields of expertise we hold the customers as our main external source, because together we can identify new possibilities.

Furthermore we have to establish strategic R&D and innovation alliances to access the knowledge and competences necessary. Additionally we have to be pro-active in every field we operate in, because we advise our customers in their market environment with analysis of future scenarios and so on. Therefore the competence level is extremely high among DNV's employees. The healthcare sector has evolved to become an important field for us, in which we

engage strongly with the hospital environment with all relevant actors with in-depth knowledge and experience. Our strategy in the healthcare field includes hiring in-house doctors and other relevant healthcare personnel as risk-consultants to ensure that we can offer the insight and competences that is necessary. DNV also has several projects where we cooperate with manufacturing industries, one example being the construction of new ships called Viking Lady with less climate gas pollution.

Question 4. DNV's main motivation for our international cooperations is first of all further growth as well as continuously being in the forefront in our operating fields, developing new services and products. We strongly rely on producing innovation, improvement and new technologies to sustain our leading market position. Energy and infrastructure is also one of our main areas of investment and we have identified India as an important partner to sustain a leading position. Our strategy includes further growth in offshore, oil and gas and we have therefore engaged in Brazil due to the liberalization process which has led to new investments in this area. Subsequently this opened new possibilities for us as we have the relevant experience from the Norwegian oil, gas and offshore development. China has become an important strategic partner for us. Liquefied Natural Gas (LNG) is an important area for us, with Australia becoming increasingly important for us in that field.

Question 5. We identify geographical areas and strategic cooperations based on the ambitions in our strategy. Our international cooperations are highly strategic and a result of in-depth research and market analysis. We engage in these cooperations to strengthen our company and to access new possibilities, technologies and innovation. DNV would not sustain the position we have today without our innovative and knowledge intensive culture which is maintained through our strategic cooperations as well as our internal culture. We are both part of domestic and international networks, this is again complex as we are a decentralized company. For example in terms of DNV Maritime and Oil and Gas, we have a range of technical committees worldwide in our most important maritime markets. They include the most important actors in the maritime industry to include the whole value chain. The networks give us inputs related to our maritime operations, in addition to create a sense of belonging for DNV in the respective markets. We also

have several networks related to authorities such as EU, to enable us to identify new possibilities, challenges and to sustain a forefront position.

Question 6. Export is not as relevant for us, due to the many offices we have established worldwide. The relationship between international cooperations and FDI is difficult to identify. Every investment decision and selection of cooperation partners are based on our strategy for further growth. These processes are interlinked and can differ to a great extent. We might identify investment possibilities in new countries as a result of close cooperations, while in other situations we engage in new FDI based on thorough market analyzes.

Question 7. The most prevalent barrier for our international cooperations is again hard to answer, as this will differ between our regional offices. Overall we do know that we meet cultural differences, in terms of business cultures. It is important for DNV to focus on our social responsibility; nevertheless there might be different understanding and interpretations of this matter between countries. We are distinguished as a company with highly educated employees; thereby we do not experience severe language problems in our international cooperations. DNV is not the company that offers the absolute highest salaries in our business; nevertheless we offer values in our work that is appreciated by our employees. The competition for the best employees is tough, and sometimes we experience that it is hard to capture the best people which are necessary to acquire the knowledge we depend upon. Different laws and regulations between countries can also be a barrier for us; consequently we have to adjust our products and services.

Additional questions:

The ICT development has opened up tremendous business opportunities for us with new markets and increased vulnerability that demands sufficient risk-analysis and certifications. Furthermore, the ICT development has become an efficiency tool for DNV in our increasing international work environment. We have an in-house software and ICT department which constantly secures that we operate in, and have cutting edge knowledge about, the forefront of new services, technologies and share-points to be able to reach both our internal and external target groups. In

our line of business we operate with a zero tolerance for error, thereby we are highly dependent upon ICT today. There are two aspects of the importance of ICT for us, an enabler for new markets on the one hand and as an internal efficiency tool on the other. New customers and markets is the most important perspective for us hence the new possibilities which have emerged from the ICT development are clearly of most importance. Nevertheless, we have to operate with the best ICT solutions internally as well to be able to offer the best solutions to our customers.

Domestic cooperation is important for us as well, but again there are regional differences in this aspect as we have geographical centers which are responsible for several countries. In Norway we work closely with the Norwegian authorities, leading universities and research institutes. Additionally, many of our largest customers are Norwegian, e.g. Statoil. Our main agenda, in terms of selecting domestic and international cooperation partners, is always based on that they are best in their field and therefore their nationality becomes less relevant.

Interview summary – Csam Health AS

Csam Health AS represents the sectoral group advanced-knowledge provider services.

The interviwer is Glenn Kenneth Bruun, Director for Innovation and Strategy.

Question 1. Csam Health is a software and development company, which focuses exclusively on developing clinical software solutions for healthcare. We primarily offer integration software solutions; additionally we have support services such as consultancy related to our existing products. Our company was established as a project at Rikshospitalet University Hospital,

initiated internally by the Norwegian healthcare sector. Thereby the fundaments for our innovative services were developed from ideas, concepts, models, technologies and software components stemming from hospitals. These were commercialized in different segments of the healthcare sector and became part of the product portfolio at Csam Health as we know it today, which was bought by private investors through Forefront Innovation in 2005/2006. Csam health is a typical Norwegian innovation firm which made tremendous investments at an early stage and reported deficits until 2008, thereby our investors had to reinvest in our company every year. It is extremely hard to succeed in the e-health business in Norway because it is a large public sector with little funding earmarked for e-health. After 2008 we experienced a positive development, as we became the fastest growing software company in Europe in 2010.

We have 80 employees, with offices in Norway, at the Philippines and in England. The Norwegian office is our head quarter, the development and coding is mainly at the Philippines while the office in England is mainly a sales department. The concepts, design and ideas to our software solutions comes from the Norwegian office, while the coding and further development of these are processed at our office in the Philippines. We operate in the Norwegian, Swedish and English market; furthermore we are considering future possibilities in the Danish market. The English market is the fastest growing e-health market in Europe today. Our short term strategy, towards 2014, does not include going into new markets. We follow the Danish market today; nevertheless we will not make any new approaches in that market or other European markets until we have established ourselves even more in our existing ones. In 2011 our turnover was approximately 71 million NOK.

Question 2. We are a commercial software company not a public institute; thereby our international cooperations are primarily driven by commercial interests. Csam health has engaged in continuous cooperation with core technology firms such as Oracle and Microsoft. These partners are important as they deliver products that we use in our core solutions. These firms also have a wide network which can lead to new opportunities for us. Additionally we engage in cooperations with Nordic partners, such as Evry in Sweden, in which our objective is to further distribute our software through them. We do not have an office in Sweden; therefore we have chosen to internationalize our software through our cooperations in Sweden instead.

Evry sells our products in the Sweden market. We also have several partners in England. Csam health also has a Merger and Acquisition (M&A) strategy in which we are looking for firms with complementary technologies for our software solutions. Furthermore our clients are highly important for our local as well as international cooperations. Our clients are vital because we work with them to develop ideas and concepts for our software solutions. Hospitals are our main clients, in every market we operate in. To exemplify, we have a close cooperation with the Norwegian Radium Hospital Research Foundation, Oslo University Hospital and Karolinska University Hospital in Sweden among others. We also engage in EU projects, with several of the hospitals we cooperate with. One of these EU projects is the largest patient-involving project today, with several 100 thousands patients from seven countries, testing the effects of patient access to their own health information in different ways.

In terms of recent innovations in our firm, we introduce new solutions on a continuous basis. Hitherto we engage in customer-driven innovations, most of the technology components exist today while we have to deliver novel ways of arranging these together in our software solutions, with highly complex databases and components working together in an integrated way. Our customers often have different demands and challenges hence we have to find the best suited software solution for each customer. In every project we try to be at the forefront, analyzing future demands and infrastructure, to ensure that we make incremental changes and keep up with the development in our line of business. Our innovations evolve around identifying opportunities and being able to produce new ways of building systems in line with our customer's challenges. Therefore the level of competence and knowledge is extremely high among our employees. Furthermore it is important that we stay proactive and present our clients with new ways of operating. In October we produced a new program, we had worked on the concept a couple of years ago, nevertheless we did not have a specific market at the time therefore it was not further developed until October. We decided to develop the program solely for Ipads, as a Management Dashboard. Our internal organizational changes have been important to follow the growth and development in our firm. Recently we have also engaged in innovative project through Innovation Norway, such as a pilot implementation in Russia. It is almost impossible to engage in private innovation projects in the e-health segment in Norway, because health care is publically managed, therefore we have to mainly engage in innovation projects with public

institutes.

Question 3. Our most important external sources today are first of all our customers, primarily hospitals; otherwise our sources are ones with a link to the health care system. It does not imply that we only relate to national hospitals, we have contact with other parts of the sector such as homecare and rehabilitation centers. It is in our interest to be connected with small firms which have specialized knowledge on a certain area in health care. Nevertheless we also have contact with large specialist firms, in the service sector as well as manufacturing, which operate towards the health care market. Although our customers are our most important source today, we expect that the technology firms we engage with will become more important in the future. We have been relatively customer-driven so far, in the future we expect a development towards less detail driven orders from the hospitals. The Norwegian health care system is rigid, and the hospitals order with highly specified requirements and guidelines for what they want us to deliver. We have not been sufficient enough to yield the full scale benefits and utility from our technology firm partners and cooperation possibilities. Hitherto we have been more customer-driven rather than driven by possibilities. Thereby we create our relations and cooperations after we find market possibilities and our clients have presented their requirements. We believe that these structures will change in the future, there are already several incubators and cooperative arenas which are working for a change regarding these tendencies. The Norwegian firms in this business and culture is also slowly changing, realizing that small firms have to consolidate to a better degree. Each firm is often too small and specialized to succeed, facing high cost levels and we see many new initiatives in Norway that fail. Oslo Medtech is a good example of an initiative working for a better consolidation of small firms in this business.

Question 4. Our international cooperations is mainly motivated by the opportunity to gain access to customers, which enables us to implement our software further. Our M&A strategy is also a part of the motive for cooperating with our technology firm partners. In other situations we engage in innovation cooperation projects with our customers, e.g. a large hospital group in England. We develop the products needed for them to reach their goals. Thereby they buy our

products and we are entitled with the software rights for further sales.

Question 5. We operate with a clear objective in terms of our international cooperations; these collaborations are based on mutual potential benefits. Csam health is part of a type of network, which includes company networks as well as individual networks that our experienced employees have access to. Our board members have extremely strong individual networks; many of our members came from highly relevant positions in the health care industry. Therefore they hold a wide range of local as well as international connections, and are active in network building across Europe. Our employees and our firm engage in projects which seek to establish stronger competence arenas in Norway, such as e.g. Oslo Medtech and Hagen-utvalget. Furthermore it is important to highlight that international networks in terms of e-health in Europe are still being established today and we are in an early phase. It might be too early to identify existing patterns and constellations in international cooperations. The e-health sector is not as mature as many other aspects of the health sector, nevertheless we anticipate a steep growth in terms of e-health in the near future. Therefore these networks are in an establishment phase. The competition in Europe and in the Northern countries will be extremely tough when the USA enters these markets.

Question 6. We have both export and FDI activities, our FDI are located in England and at the Philippines while we export to Sweden and England. If we succeed in England in a short term perspective, we expect our turnover in England to exceed the turnover in our Northern countries. The relationship between our international cooperations and our exports and FDI is not a definitive one. We decided to enter the English market after visiting hospitals and potential customers, presenting our technologies and through these visits we have obtained knowledge about the English market and the demand in that market. Thereby we operate with marked analysis before we enter markets; then our international cooperations have been established in those areas in which we operate. Hitherto we have not made decisions for our FDI and exports based on existing international cooperations.

Question 7. Hva anser dere som det største hinderet for å inngå/få utbytte av deres internasjonale samarbeid? Eksempelvis: problemer med beskyttelse av rettigheter (IPR), forskjellige lover og reguleringer mellom land, geografisk avstand, kulturell avstand, kostnader av å opprette kontakt nettverk utenlands, mangel på risiko kapital. Hvilke politiske endringer/tiltak kunne bedret deres nytte av internasjonale samarbeid? We have not experienced critical challenges in terms of barriers for our international cooperations. The challenges we have some experience with is especially regarding different laws and regulations between countries, in terms of contracts, product standards and certifications. Therefore we use legal advisement, the law firm Haavind AS, which has a large international network as well as offices in England. Although necessary, this is highly expensive for us. Furthermore we also have experienced some challenges towards large technology companies, such as Oracle. We have signed cooperation contracts in Norway with Oracle; nevertheless these are not viewed as valid at Oracle in England because they do not see any personal benefits unless they get something in return. We do not experience any barriers in England or in Sweden when we engage in innovation projects.

Additional questions:

Obviously we would not exist without ICT and the ICT development. Internally in our firm we always operate with the best and most updated software programs to further develop our products. The licenses we buy are built upon the most modern ICT developments. We do not develop hardware devices; we use them when we develop our software solutions.

Our domestic cooperations are important to us as well. It would be hard to experience international success without being able to present previous success in our domestic market. Hitherto we have been dependent upon our Norwegian customers. Nevertheless; our international cooperation firms have been most important for our technology development. We are starting to receive more inputs from outside of Norway. Norway is still our main source today; nevertheless we anticipate a change in this regard in the future. Csam health will benefit from such a development and the utility will increase for those involved in e-health in the future.

Interview summary – Telenor

Telenor ASA represents the sectoral group network infrastructure services.

The interviewer is Dag Ragnar Larsen, employed 20% as a Research Leader in Telenor ASA and 80% as a Project Leader in Canal Digital, which is a company owned by Telenor.

Question 1. Telenor is a company that primarily operates in the telecommunication business; nevertheless we operate on a larger scale than just that. We are also a distributor of TV-signals, fixed-line telecom as well as mobile signals. Telenor Group is one of the leading mobile operators in the world, with 146 million mobile subscriptions. We have mobile operations in 11 markets, and an interest of 35.66 % in VimpelCom Ltd., which operates in 19 markets. We have 30 000 employees on a global basis. Last year's turnover was 98, 5 billion NOK.

Question 2. We engage in various forms of international cooperations, it is difficult to identify each and every one. I will rather exemplify, with our respond to one of our competitive products from Apple and especially the services they deliver through Apple store and App store. We have engaged in a project called Wholesale Application Community (WAC). This cooperation is between Telenor and several other mobile operators and a few mobile producers, for example those that develop the Android operative system, as a counteraction towards App store which has taken a relatively large share of the market. WAC is an example of a rather comprehensive international cooperation that we have participated in. Another example is a cooperation project which aims at standardizing communication protocols with other international cooperations, unfortunately I do not remember the specific names of our cooperative partners in these projects. Standardizing communication protocols involves defining how the communication and information between telecommunication companies should be built up. This is a highly technical matter, which aims at standardizing technology between companies and therefore primarily between us and those companies that we have close relations to.

Telenor has definitely introduced new services during recent years, which is something we do rather often. We do not develop the innovations we have introduced in-house; more often we introduce innovative services that benefit our users, which we get access to through our cooperation partners on request from us.

Question 3. Our closest relations are directed towards other companies, due to the fact that we do not develop much of our new services ourselves. We buy services from external sources to a high degree. Telenor engages in these operations both based on one time agreements as well as with cooperative partners that we have long term contracts with. The Chinese company Huawei, which is a leading ICT solutions provider, is an example of one of our long term international cooperation partners. We have an ongoing project with Huawei in which we are replacing the entire core mobile network. Related to this project we also have a R&D cooperation project in long term agreements. Otherwise we induce a project with a clear vision of what type of service we demand and search for the best offer from service suppliers which operate in our field of interest. In my experience we do not have any significant relations to manufacturing companies; it is mainly other service companies in the telecommunication industry or companies that supply services to this industry. Telenor differs in their cooperative patterns, from one time only projects, to small R&D projects or agreements that involve services between companies. The value and utility of these cooperation agreements is essential for our company, especially because we do not develop our own products in-house. We depend on acquiring new knowledge and resources from external sources, as Telenor does not recruit enough human capital to develop new products themselves. Telenor has enough resources to analyze and evaluate third parties and thereby selecting fruitful cooperation partners, international as well as domestic. Telenor has often chosen international partners instead of domestic ones based on price differences, in which they view as more beneficial although risky in terms of potential cultural and governance differences. Huawei, as an example, presents us with beneficiary prices that we consider to overweigh other potential risks.

Question 4. Telenor's general motive for everything we do, including our international cooperation, is to generate more income and to improve our competitive position. To be able to

reach that goal we have to get involved and cooperate with other companies. In our market we have to be relatively innovative to be able to stay alive and sustain as a competitive company. Telenor has to withstand a functioning and modern mobile network at all times, which is economically intense. We are continuously faced with new products and services that require even more from our network capacity. On top of our network we have innovative services that benefit our users, which we get access to through our cooperation partners on request from us. R&D is important for us and we have several cooperation partners in this perspective as well. These are based on international partners as well as higher education institutes in Norway, such as Universitetet i Oslo (UiO) and Norges teknisk-naturvitenskapelige universitet (NTNU). We consider these R&D cooperations as an open innovation activity and a strategy, to be able to access and implement new knowledge in the firm.

Question 5. Yes, Telenor's international cooperations are organizational strategies to enable us to improve our services and products. We are definitely a part of a global network, in which we have closer ties to some of our cooperation companies while others are contacted when needed in specific projects. The network in itself is of a strategic character with certain frameworks, terms and prices at place for our most important supplier companies. Those countries that are most attractive for our cooperative activities are mainly chosen based on their prices. It is possible that other business areas in Telenor have certain countries as a part of their strategy, but I do not have specific knowledge about that. Telenor has foreign offices in a vast number of countries worldwide, in which the preferences towards countries might differ. Our innovation strategy is two folded. First of all we have our Research Future Studies department, where the main goal is to increase the knowledge level that resides with our employees. Secondly, in each business unit the goal is to renew the products in a way that yields higher income. The relationship between these two aspects is based on the vision that the research units are the supporting foundation for the business units, inspiring to new ideas which can be successfully implemented in the market.

Question 6. To exemplify on this matter I relate this to our investment in India. We often use the Norwegian Telenor office and their operations as a benchmark for foreign investments. We use experiences and knowledge from Norway and other operational countries, learn from them and

seek after emerging markets with potential for successful implementation of products that we have had previous success with. These investments are not always a success; nevertheless we primarily select our investments based on market analysis. It is also likely that we have invested in some countries due to successful cooperations and investments in surrounding countries. The interactions between all our offices is a complicated issue, as every office operates according to their countries respective laws, regulations and local market structures. Furthermore, every office has certain financial demands to fulfill and reports to Telenor Group, and they are measured closely. The operational structure can differ to a great extent between countries, not all products that are successful in Norway will commercialize successfully in some Asian countries for example.

Question 7. The main barrier to our international cooperations and investments are the legal and governance differences, which can be related to cultural differences. Different law and regulations from one country to another is absolutely a hindering factor for us. Our ongoing challenges related to our investments in India highlights these challenges. Cultural differences are in my opinion our biggest barrier. The geographical distance is not as big of a barrier anymore, with the ICT development as an enabling factor. Geographical structures in terms of landscape, when we construct mobile networks, can also be challenging. Technically challenging geographical landscape can become extremely expensive. In my opinion, the political action that could improve our situation is directed towards regulating the licenses we have to purchase abroad in a more active manner. The licenses we purchase in foreign markets are often controlled by the respective governments, placing us in a vulnerable situation. Once again our Indian investments represents as an example.

Additional questions:

The importance of ICT for Telenor as a company is vital. We would not exist as a company without the technological developments that we have experienced the last decades. In present time we have a service called Way Of Work (WOW), which enables us to interact with every employee on a global basis. We can exchange files, videos, conferences and communicate through different forums anywhere we are. This database can be used to access and share

knowledge, get in touch with relevant employees as well as including external partners and clients. We also share project works on this database. WOW is highly beneficial for us; it functions as a knowledge distribution tool as well as a good way to cooperate with others.

Domestic cooperation is also highly important for us. Higher education institutes are especially relevant. We also have many cooperation companies in Norway to establish business services. These are primarily linked to our Norwegian market. Telenor aims at being a local actor as well with a highly visible position in Norway. We are genuinely interested in supporting sport activities and so on, being present in our home country. The importance of domestic versus international cooperations is highly dependent upon which context you interpret this question from. From the perspective of Telenor Norway, one might say that domestic cooperations are more important. Telenor Group, as the Headquarter and which operates in terms of a wider perspective, would most likely highlight that international cooperations are more important. International cooperations enable us to engage in larger projects and potential successes, which thereby can be implemented to our many global offices.

Interview summary – IF

IF insurance company represents the sectoral group network infrastructure services

The interviewer is Jens Gravdal, the Nordic Executive for Foreign Claims in car injuries.

Question 1: IF insurance is a Nordic company which covers all insurance areas and has a strong presence in Europe. IF is owned by a Finnish company, while the administrative headquarters are placed in Sweden. Our company is the largest injury insurer in the Nordic area, with a 20 %

market share. I am responsible for foreign car injuries in the Nordic areas as well as the majority of Europe. If has approximately 6300 employees worldwide, with approximately 1800 employees in our Norwegian offices. The turnover in 2008 was 29 billion SEK.

Question 2: In my department we engage in cooperation agreements with a large share of the European countries, known as "green card agreements". This agreement includes approximately 44 countries today. We have to include all the European Union countries, but besides these we can choose cooperation partners ourselves. This is regulated by international laws, which is formally called "internal regulation". This law was applied in 2003 and was built on the green card agreement, which was approved in the United Nations in 1953, and several old multilateral agreements to become one international law that applies for all the participating countries. We also include countries outside Europe, for example Russia, Tunis, Morocco, Iran and Israel have also been a part of the network. Our customers do not have to show any documents as long as their car injuries occur in the EU or in the European Economic Area (EEA) as the car registration sign is enough. Outside these areas the users have to deliver their green cards to our cooperation partners. These agreements are in place to enable that the users experience the same service quality in these foreign countries as they would experience at home. That is our main motto for foreign injuries, and the message to our Norwegian customers is that our home is the Nordic and Baltic area and that you will be taken care of in the same way no matter where you are in our international network. Our cooperation partners include our foreign IF offices as well as five other insurance companies which specialize in injury regulations. My job is therefor to sustain a close and fruitful relationship with all my partners; I visit them at least once a year as well as withstand good communication through videoconferences. Our innovation activities are twofold. We interact closely with our customers and always try to shape our services according to their needs and we have endured large organizational changes since IF was founded. It is highly important for us to use courses and that information is implemented further in our network. It is extremely important for me that my employees are offered training in IF. I work directly with customer advisors as well as the executive group. In a more general perspective we have acquired most of our technology from Finland.

Question 3: Our primary external sources are SOS international, which is an alarm company, which are not an insurance company but specialize in crisis and help people in need. Indirectly we are also in close contact with car leasing companies. We are mostly in contact with other service industries that have the expertise and knowledge related to our work. It is important for me that we are connected to the right people in Europe so that we have a sufficient international network and the knowledge to help our customers when they are in difficult situations abroad. Our network works as a mutual network, in which it is in our own interest to help our international partners when needed. Thereby we are more likely to receive better services from them in the future when we need their assistance. If our own foreign IF companies do not satisfy our Norwegian customers I am able to use the other partners when needed. It is important for me that we have several options for our customers. Every foreign IF office is part of this network.

Question 4. Our primary goal for the international cooperation is to deliver the same service standard to our customers regardless of which country in our network they need our help in. We want our customer to feel safe and that they trust that their insurance is with them abroad as well if a car injury might occur. It is extremely important for me that we have close relations with all our cooperation partners, and that every partner that represents our services delivers the high level service grade that IF requires. Therefore we practice service level training, which is important for us. IF is supposed to be known for the extra amount of service and determination towards their clients, and we expect that from our international partners as well. The competition in our market is tough, and we are an attractive cooperative partner. We expect our external partners to deliver and sustain high quality services to our customers in order to be a part of our international network. Furthermore we are and should be a company that differs from our competitors in the Norwegian market. Our goal is to be viewed as an international company, and we brand our name in that manner. For example, SOS international represents us on many occasions through their services in Copenhagen.

Question 5. Our international cooperation was and still is a strategic action. International car insurances were not new per se, but it was a new service offered from IF when we started this project. The service level and quality was highly improved. When IF was founded in 1999 we

decided to develop as many international offices and partners as possible. Today we are in a growing stage, towards becoming an even bigger and improved company. We cooperate across boarders and utilize from each other's experience and knowledge. We are constantly pursuing new products in other countries that we do not have on the domestic market. The Business and Development department is responsible for finding new solutions before our competitors. They do not only look for new insurances, it is also important to search for better and more efficient solutions to improve the quality of our existing services. We have experienced improvements in our service quality with the ICT developments, which has resulted in more effective computer systems today. We have also developed better relations and communication opportunities with our international partners.

Question 6. The relationship between our FDI and international cooperations is complex and hard to answer. We choose to hire new people when we consider it necessary, otherwise we rather search for cooperation partners. We are very dependent upon our foreign offices and cooperative partners, especially because there are tremendous differences between laws and regulations related to insurances across countries. Our partners work under strict pressure from us, as we demand detailed feedback which gives us full insight about a certain car situation and the following process. This type of information is customer service for IF, and is vital for us to be able to learn from situations and further develop and be better in the future. It is profitable for us to develop close ties with our international cooperation partners, which will increase their knowledge about our company as well. This is a strategic action, as closer relations and more knowledge about IF will produce more relevant information flows from our partners and better communications will help me provide IF's customer advisors with more fruitful information.

Question 7. The main barrier for our international cooperations is cultural differences and different laws and regulations between countries. We have experienced lack of trust from Bosnia and Serbia, which resulted in insufficient payments from these countries. IF Norway chose to end the cooperations with Iran, Tunis and Morocco due to the vast cultural differences, language barriers as well as only a marginal share of the turnover came from these countries.

Additional questions:

We are highly dependent upon ICT. Our service quality has improved enormously with the ICT development and has opened new possibilities for us and for our customers through our improved computer systems. These developments have also been crucial for our close communication and relations to our international cooperations. Today's IF would most likely not exist without ICT. We have experienced cost minimizing effects from the ICT development, e.g. we can reduce travel costs by using videoconferences with our external partners.

We also engage in domestic cooperations, although the international cooperations are much more important.

Interview summary – Antra AS

Antra AS represents the sectoral group Physical Infrastructure Services.

The interviewer is Fredrik Lien, the Managing Director of the company.

Question 1. Our company sells and delivers technical equipment to ski resorts. We deliver our equipment to the Norwegian market, which is the biggest in terms of cross country track preparation machines on a global basis, as well as a marginal share to Greenland and Denmark. We have a 67% market share in the Norwegian market, and consider ourselves as being in the front of our field. The company has experienced strong turnover growth since 2001, after investing in enhancing their service quality as well as developing a stronger sales department. We have a relatively flat internal structure, and our employees' remarks and insights towards

future changes are taken seriously. Antra's turnover in 2011 was 90 million NOK and we are 15 employees.

Question 2. We engage in an international cooperation with our German supplier Kässbohrer, which produces all the equipment and machines that we deliver to our customers. There are only two companies worldwide that produce our machines and equipment; Kässbohrer and an Italian supplier. We use this cooperation to further enhance our service quality, as well as the quality of their technical equipment through feedback as we develop experience in terms of how these machines work in the environment that our customers operate in. We specify our demands to our German producer, mainly to get access to improved technical equipment rather than lower prices. They use our requirements to further develop improved technical machineries, which often lead to test models that we use and more importantly give our remarks and feedback. Antra has previously engaged in cooperations with French and Canadian suppliers before they were bought by our German supplier. We also have a close cooperation with a Swedish company that delivers the same services and equipment to the Swedish market, which also buys their equipment from the German company we use. The Swedish cooperation has led to several projects, in which we order equipment from the German supplier together, with the objective of obtaining economies of scale. Thereby we have an opportunity to entail a stronger position when we specify our requirements in our orders. Antra also has a minor international cooperation with a Swizz company that produces alpine tractors. These tractors generate only 5% of our turnover; nevertheless we have chosen to offer these to exploit free capacity during periods with low demand for our main products.

We have not developed innovation ourselves recently, nevertheless we have actively contributed to improve technical components in our machines and worked closely with our supplier to ensure implementation of these improvements. E.g. our supplier has bought the patent for one of their technical improvements in a machine they delivered to us, after we discovered an efficiency potential through a marginal technical reconstruction in a component.

Question 3. The customers are our closest and most important external source, e.g. Norsk Alpinanlegg, Norwegian counties and firms that prepare skiing tracks among others. We sell our

services to them, hence they are our most important source of external contact. In terms of our international partners our German suppliers are most important for us as they produce the equipment that we offer to our customers, and we rely on them to produce the best technical equipment to be able to withstand our competitive position.

Question 4. Our main motive for our international cooperations is to access and buy technical equipment to improve our value chain. Nevertheless we are also a highly important customer for our German supplier due to our strong position as a supplier to the Norwegian cross country market, and we have mutual benefits to withstand a good relationship. We are satisfied with the markets we are engaged in today; therefore we do not use our cooperations to find new markets.

Question 5. These international cooperations are a strategic actions from our point of view. We have a strong position because our German supplier is especially interested in the Norwegian market. We also view ourselves as part of a network related to the track preparation machines, including us, our German supplier, the Swedish firm as well as our customers.

Question 6. We have some export activities in our company, mainly to Greenland and a marginal share to Denmark. There is no prevalent connection, or causality, between our exports activities and our international cooperations. Our export activities have emerged from connections between some of our employees and the ski-association in these areas, which is how we entered the market in Greenland for example. We do not have any foreign offices because in this business we are operating in the most attractive market, which is the Norwegian market.

Question 7. The main barrier towards our international cooperation is different laws and regulations between countries. We have experienced challenges regarding e.g. new machines in which the Fair Trade Commissions in the EU approved while the Norwegian Fair Trade Commission did not, imposing vast distribution challenges. This project was therefore not implemented, although we saw promising markets for these machines, on a more global basis as well. The limits for where the Fair Trade Commissions choose to interfere differ greatly between

countries in Europe. Regulatory and legal differences are the thereby our main barrier, also including import regulations and regulations for use of our vehicles/machines. The tractors that we import from Switzerland require modifications and a lot of paper work from our employees before they can be used in Norway, although approved in the EU. In general, the regulatory legal systems are often hindering efficient flow of our services. It is time-consuming and labor intensive to access the necessary information in these situations, which are resources that could be allocated to other more productive areas in our firm.

Additional questions:

We do not have a cutting edge ICT system, nevertheless the ICT development has obviously been an efficiency tool for our internal and external communication. We primarily interact with our partners using e-mail and telephone contact. Antra is connected to the order-system at our German suppliers which has been beneficial for us as well as Kässbohrer. Additionally we have two or three formal meetings a year.

Antra has engaged in domestic cooperations with four engineering work shops, which offer services for us. Nevertheless our international cooperation, especially with our German supplier, is of more importance to us.

Interview summary – H Strøm AS

H Strøm AS represents the sectoral group physical infrastructure services.

The interviewer is Lars Strøm, Managing Director and the owner of the company.

Question 1. H Strøm is a traditional transport company. We have 20 employees in our two Norwegian offices; the turnover for 2011 was 80 million NOK. We do not have many employees, which is s strategic action. I choose to buy services externally when possible, rather than to employ new people. We transport and deliver goods from e.g. München to Bergen or Oslo to Trondheim for a given customer. Our company started in 1976, nevertheless in 2003 we initiated Rale Terminal Drammen (RTD) which means that we started to utilize the railway for our transport services. We receive railway carriages which have been loaded in several European countries with goods ordered by our Norwegian customers, such as e.g. ICA, Rema and Norsk Stål. Thereby we use the railway as a transport carrier for our customer's commodities. After RTD was started, 99% of our operations have been railway transportations. We saw this opportunity after NSB's monopoly was dissolved and the railway was liberalized to a greater extent, with more competition and possibilities than before. H Strøm was the only Norwegian firm at the time which used this opportunity to move our service from the road to the railway. We received an environment award from "NHO Transport og Logistikk" in 2010, in which they highlighted that we developed and shared knowledge about sustainable and innovative operations in logistics and transportation.

Question 2. We engage in international cooperations, which is important to us, because either our customers are based abroad or our customers' suppliers are. We have a contact network with suppliers around the European continent, as they have the goods that we deliver to our customers. The first and most important international cooperation that we engaged in was with a Swedish paper fabric, Scann Fiber Logistics, to enable a more comprehensive logistic chain and to accomplish continuity in the transportation traffic. The reason we engaged in this cooperation is two folded. The field of logistics revolves around the balance in trade directions. Norway is an import nation, which has implication for the price mechanisms in our market; we consume more than we produce. Norway, as a country, has an competitive advantage in the production and export of oil, gas and other natural resources that we have in abundance in Norway, which is highly profitable for us. Nevertheless we have relatively little other traditional industry exports, e.g. Norske Skog was recently closed. Sweden on the other hand, in terms of their paper industry, transports extreme amounts of commodities such as e.g. newspaper and paper rolls for juice millboards which are sent to Italy by train. We saw an opportunity to utilize these trains

before returning to Scandinavia, in which we load these with cargo from our suppliers in Europe and transport these commodities to our customers in Norway. Thereby we have accomplished a sustainable and profitable logistic chain in cooperation with our Swedish partners, as well as our other European cooperations. We would not be in this position without the export activities from Sweden, which gave us the opportunity to buy these railway carriages after they had delivered their cargo in Europe. Our objective was to obtain a price per unit which made us competitive. We accomplished that objective because the quantity we can load using railway carriages exceeds the capacity which is possible using traditional trailer trucks on the road.

We have introduced new services, which also was partly financed by the Norwegian system Skattefunn that we have engaged in for many years. Skattefunn directed us towards new ideas for our firm and made us think in other terms. They found projects as long as the service was new for the firm, which led to the potential from the Swedish trains for the Norwegian market. Furthermore, the Norwegian state owned NSB Cargo Nett had a product which they assumed would not have a profitable market. We saw possibilities and took this project further, in cooperation with the Swedish firm Green Cargo and highlighted that these types of commodity flows exist and are highly profitable. We further redesigned the framework and today we have a commodity flow that encompasses more variety than we had in the past. Today we have engaged in cooperations with several domestic partners in our field, working towards a new terminal structure for the eastern region in Norway. In my opinion this project is our R&D project today, in which we have delivered a regulation proposal for a specific industry area that we recommend to be one of three railway and lorry terminals in the Oslo region.

Question 3. Our primary external sources are our customers and suppliers. We depend upon large volumes in our business hence we have a system for large quantities. Regularity and daily traffic is important for us. Our objective is therefore to hold an intermediary role as a contributor for decreasing the distance between our customers and their suppliers and fabrics. Our employees are responsible for having the insight required to withstand a rigid structure between a customer and the respective production fabric. We have to have an informed and integrated culture to be able to know what our customers will require, and that the suppliers and the remaining logistical chain will meet these requirements. Our daily operations exceeds the railway transportation per se, we have to ensure that we have sufficient knowledge about our customers and suppliers as

well as good communication with them, authorities and the railway operators.

Question 4. Our primary motive for our international cooperations is to make our relatively path-breaking product/service to work in a relatively new system which was liberalized recently, and still has a long way to go in terms of old protectionism which is difficult to work a alongside with. We have experienced growth in terms of the volumes we are able to transport, nevertheless this has been, and probably will continue to be, a slow process. The motive for our international cooperations therefore is to withstand our competitive position and to keep our logistic chain as effective as possible.

Question 5. Our international cooperations are highly strategic operations. It is the only way we can further develop our service quality in this complex and protectionist market. In my opinion we are definitely a part of a network. It started with our Swedish partner, Scann Fiber Logistics, which exported their products to Southern-Europe using the railway. After the railway was liberalized in Norway we engaged further in this process, increasing our network in Europe hence we could develop a more comprehensive and effective logistic chain.

Question 6. We do not have any export activities, and we do not have foreign offices either. The trains are transported empty from Norway to Sweden, to continue the value chain from there with exports back to Europe again. We have not invested in foreign offices due to financial aspects. It is extremely expensive to invest in the railway business. We therefore rather engage in international cooperations and by renting locations and so on. We have, so far, been risk averse in this aspect, we are operating in a relatively new field and we meet protectionism and other legal and political challenges on a regular basis.

Question 7. Our main barriers for our international cooperations are most of all different laws and regulations across borders as well as old protectionism that still prevails in the railway system and institutions. We have chosen to move cargo from the roads to the railway, in line with the main topic that the politicians in the EU as well as in Norway highlight as an important

step towards a more sustainable development. Nevertheless we experience lack of political will and slow progress in our field. We do not have the sufficient infrastructure to manage the potential cargos which can be moved from roads to the railway. Therefore we unfortunately often use more of our resources on politics rather than our customers.

Additional questions:

ICT is highly important for us and our daily operations. The railway is only a part of the logistic chain, we use ICT to ensure the data flow necessary to withstand good communications and correct orders from our customers, suppliers and partners. The process from order to delivery from our customer to their fabrics is vital for our service quality. ICT systems enable us to be effective in those aspects, as well as with our tracing systems and internal control.

We have domestic cooperations as well. Our customers Norwegian companies, all over the country, thereby we have close ties with them and distribution partners in Norway. Nevertheless; without our international connections we would not have a domestic distribution, because the commodity flow comes from Europe.

Interview summary – Thon Hotels

Thon Hotels represents the sectoral group personal goods and services.

The interviewer is Morten Thorvaldsen, the Managing Director of the company.

Question 1. Thon Hotels is a department in Thon Gruppen, which is primarily involved in hotel operations and property. Thon Hotels manages the hotel- and restaurant operations, and we

mainly operate with travel service activities, conference activities and restaurant activities. Thon Hotels is one of Norway's leading hotel chains. We own 60 hotels located in Norway, five in Belgium, one in the Netherlands and one in Sweden. We also have six franchise hotels in our portfolio that we do not own, but these hotels are nevertheless a part of our sales and marketing. Our turnover was 2,6 billion NOK in 2011. 70% of our turnover is from Norway and Sweden, while 30% is from our international investments. We have 5500 employees, while the majority of the hotels in Norway have approximately 10-15 employees.

Question 2. We are engaged in an international cooperation called Global Hotel Alliance (GHA), which includes approximately 600 hotels that deliver their services worldwide. GHA is our internationalization link, which enables us to access the global market to a higher degree. This cooperation also makes us more visible in the world and towards potential customers outside our main operating areas. This type of cooperation is our way to access foreign customers. Our services are available at their web sites and booking sites. GHA offers an international package that you buy access to, in which this alliance promotes sales, marketing and loyalty programs. Furthermore, we get access to an international network and important contact relations in our market. We are also involved with Innovation Norway's project on supporting the tourist sector. Innovation Norway promotes us in different scenarios and contacts us if e.g. there is a conference at an embassy in Norway. In that manner they also open up doors for us to access international markets and potential clients.

We have engaged in an innovation project since 2010 in cooperation with TrioVing, the project was completed in May this year. In this project we have developed a service which enables our customers to use their mobile phones as room keys in our hotels. We have an internal IT engineering department in our head quarter, which includes five engineers who work with analyzing trends and potential possibilities. These engineers developed this service with help from TrioVing, which specializes in lock systems. We are testing this service in a selection of our hotels today. We have several other systems which are developed, improved or selected by our IT engineers such as e.g. our intra-net, HR system and our internet services. Furthermore, we have bought technology from the French company Areane, which enables automatic check-in in our hotels, similar to the automatic check-in service available at airports today. This is being

tested in our hotels in Brussels. Thon Hotels, together with the Choice hotel chain, is more advanced in the use of technology, compared to the average hotel in Norway. These are often small companies which use much less advanced technologies. They mainly offer simple wireless networks and standard use of computer systems.

Question 3. Our main external sources are our customers and suppliers. Domestically, our main customers are connected to the state and counties. Our suppliers in general are an important external relation; both business wise and in terms of our cooperations. The most important domestic suppliers are our largest suppliers, e.g. Tine Norske Meierier, Ringnes, Coca Cola, Imsdala and airline companies. We have close contact with these suppliers, because we are interested in engaging in different activities with them, e.g. by promoting Norwegian products and food culture with Tine Norske Meierier. Our most important customers are our closest external sources in terms of our international cooperations, such as Statoil, Yeni, DNB, Yara and the airline companies.

Question 4. Our main motives for our international cooperations are two-folded. First of all we use our international cooperation partners to attract foreign customers to the Norwegian market and thereby increase our sales. Our cooperations enables us to build relations and contacts, which again makes it easier to sell our products. Secondly, we engage in these cooperations to access new markets. GHA helps us to analyze potential possibilities for future investments. We also have the opportunity to get a better understanding of foreign business cultures through our international cooperations, which is highly important for us.

Question 5. Our international cooperations are definitely a deliberate organizational strategy. These cooperations also set certain directions for us, in terms of using our alliances to stake out what the new trends are and what we have to modernize to stay competitive. We have the possibilities to access information about the development in the travel service business and the international traffic to Norway. We are engaged in several domestic cooperations and networks to investigate what the customers demand from the Norwegian travel services, such as e.g.

Innovation Norway, The Ministry of Trade and Industry and Nord-Norsk Reiseliv.

Question 6. We have invested in hotels in the Netherlands, Belgium and Sweden. We do not have any export activities; nevertheless we promote our international cooperation partners towards our customers when they are traveling to other countries. Our international cooperations have been important for our FDI. We operate in a tough market, and we have used international cooperation to view the market possibilities. Thereby our international cooperations has led to our foreign investments.

Question 7. The most important barrier for our international cooperations is policy related. The laws and regulations are different and are often changing. In terms of our suppliers and the products they deliver, we are met with differing import taxes between countries. Business frameworks differ between Norway and other countries, the social costs are higher in many of the countries we operate in which implies that it is more difficult to succeed in many foreign countries. The operative costs are higher abroad, although the commodity expenses are lower abroad due to lower import taxes etc. Due to the global economic situation, we are met with challenges regarding the international customer traffic because of the strong Norwegian currency. In general it is challenging for our international cooperations and activities that we experience policy and regulatory differences and changes along the way. On a national level we have to apply for several new licenses for our hotel operations every four year, which make long –terms investments more challenging.

Additional questions:

Our daily operations have become dependent upon our computer networks, mobile phones and so on. This is because all of our hotel orders are delivered through our internet system. Additionally, we have become more dependent upon mobile phone technologies as our customers can order our services from their mobile phones as well as using them as a substitute for room keys. ICT is also very important for our management, sales department and marketing.

It is highly important for us to follow the development in ICTs.

Domestic cooperation is just as important for our company. It is important for us to have close relations to our domestic market, as this is our main income source.