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**Service Innovation – New Service Development with Deep
Involvement of Users and Value Networks**

by

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PREFACE

This report is a documentation of studies of service innovations in Norway. The project “Service innovation - new service development with deep involvement of users and value networks” has been funded by the Research Council of Norway and was designed as an introductory study into the field of service innovations on the firm level. The overall objective of these introductory studies has been to better understand the conditions for, and the effects of, adoption of new technology-based service innovations. Three project goals have been formulated:

To systemize user behavior as a source of service innovation

To sketch methods and instruments for estimating the needs for behavioral changes

To understand value networks (cooperative partnerships) to increase effectiveness of service innovation processes.

The report presents research propositions based on literature reviews and analyses using three different empirical sources: 1) the Norwegian data of CIS-3; a strategic survey of selected service firms; and case studies.

The report is a result of a joint effort where the literature reviews and empirical analyses of customer involvement and of value networks have been done by Per E. Pedersen and Leif B. Methlie respectively.

Bergen and Grimstad, December 2005

Leif B. Methlie Per E. Pedersen

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ABSTRACT

Service innovation has gained interest in recent years and new initiatives have been taken to integrate product innovation and service innovation research. One of the reasons service innovation has gained interest is that it includes not only innovation in service industries, but also service innovation as service encapsulation of goods and other services. Still, the literature on service innovation is fragmented and more knowledge is required to develop successful innovation policies and innovation management practices.

This study investigates the relevance of customer involvement and value network partnerships in service innovation. Both topics are reviewed in separate literature studies reported in section 2. From these reviews, sets of testable propositions are developed. The propositions on customer involvement are further investigated by analyses of secondary data from the Community Innovation Survey (CIS-3) and primary data from an empirical study of customer involvement in the service innovation processes of selected service firms conducted in 2005. Propositions on value network partnerships are investigated by two case studies and by comprehensive analyses of the CIS-3 secondary data. The method applied in these studies is elaborated in section 3, including how new measurement instruments capturing these service innovation characteristics were developed.

The investigations show that customer involvement has no universal effect on service innovation results. However, they also show that specific types of involvement have positive effects on service innovation results and that these effects are universal to all service firms. Thus, customer involvement may be used to improve service innovation processes and obtain positive innovation results, but the specific types of involvement must be carefully chosen to obtain

the wanted innovation results. Similar results were found for value network partnerships, which had a positive effect on innovation intensity for both new-to-the-market and new-to-the-firm innovations, while no general effects were identified on innovation processes. Supplier cooperation, however, showed a positive effect on innovation processes intensity. Thus, engaging in specific cooperative arrangements seems to have positive effects on innovation intensity and innovation processes, and further detail on these relationships are given in sections 4 and 5.

This report contributes by the empirical findings reported above and by the other detailed findings reported in sections 4 and 5. In addition, the theoretically derived propositions presented in section 2 summarize much of the status of our knowledge of customer involvement and value network partnerships in service innovation. Furthermore, the measures developed to capture these elements may be applied in further studies of service innovation processes and types. The findings from this report have implications for innovation policy, service management and service research, suggesting that service innovation differs from product innovation and requires particular attention by innovation policy makers. The findings also guide service firm managers in deciding how to involve customers and engage in value network partnerships to obtain positive service innovation results and help service innovation researchers in their development of measurement instruments that better capture the unique characteristics of service innovation.

1 INTRODUCTION

Simple analyses of the data provided by the StatBank of Statistics Norway show that in 2004 service industries represent approximately 59% of the Norwegian gross domestic product (GDP). When excluding the oil and gas sector, service industries represent 79% of GDP, and including the oil and gas sector, service industries employ 78% of the Norwegian labor force.

While innovation researchers previously considered innovation in services industries less interesting due lack of innovation intensity (Econ, 2003), service innovation has gained interest in recent years (Hauknes, 1999, Den Hertog, 2000, Fagerberg, 2004, Miles, 2004, Von Tunzelmann and Acha, 2004). New initiatives have been taken to integrate product innovation and service innovation research (Drejer, 2004). One of the reasons service innovation has gained interest is that it includes not only innovation in service industries, but also service innovation as service encapsulation of goods and other services (Howells, 2004), as well as innovation in information intensive services as part of service oriented architectures.

As the two terms of the construct “service innovation” suggests, research of relevance to service innovation includes at least the two traditions of innovation research and service research. *Innovation research* originates from economics and empirical social science and has mainly focused studies of innovation at the industry and policy levels. Its focus has been both descriptive and normative, but normative implications are mainly derived at the policy level. Despite some recent efforts, innovation research has paid relatively little attention to service innovation. *Service research* originates from marketing, production theory and strategy, and has mainly focused studies at the firm and network levels. Its focus has mainly been normative and directed at firm level management. Most of the attention in service research has been paid to problems of service operations

management and service marketing, whereas little attention has been paid to service innovation - termed “new service development” in this field.

Services are generally believed to be created, produced and consumed at a singular moment (Sasser, Olsen and Wycoff, 1978). Thus, service innovations are believed to be behavioral innovations based less on generic sources and methods of classic product- and process innovations, such as technology, R&D, institutional sources of information and standardization, and more on sources such as customers and competitors. Typically, service innovations are often incremental innovations based upon the availability of a service platform. An example is Short Messaging Services (SMS). SMS was considered of no value to carriers until end-users created new patterns of communication behavior and new forms of SMS use. Then, carriers developed platforms for distributing all sorts of content and transaction services over SMS. Now, most of the carriers’ income from mobile data services comes from this type of services. A similar situation is found for Internet-based services where the end-users, often by collaborating with other end-users, create much of the service content.

In new product development, customers are now increasingly considered a valuable source of information. The reason is that differentiation is a source of competitive advantage. The best way to identify these advantages is to include customers in new product development processes, often using ICT-based support tools (Sawhney and Prandelli, 2000, Nambisan, 2002, Hippel and Katz, 2002). Services are often characterized by inseparability requiring customer involvement in new service development. However, intangibility and extrinsic sources of service value, such as direct and indirect network effects, challenges the usefulness of involving customers in new service development. It is difficult for customers to assess the value of intangible services and services where the value depends upon simultaneous use of the service by thousands of other users

1.1 Problems

We assume that value creation in service innovation requires a technological opportunity and the innovative behavior of end-users using this technology through the services offered by it. Service innovations thus require consumer behavior or change in consumer behavior. The combination of a technological opportunity and the innovative adoption of this opportunity is what creates value. Innovative adoption may include changes in single user behavior, coordinated change in behavior by several users or user groups, often through new norms of use or standards, coordinated change in providers' way of producing or distributing services based upon the technological opportunity, and regulatory or governmental authorities' acceptance of the behavioral change of consumers and providers. For example, the value of SMS-services required that end users developed new forms of written communication limited to 160 characters per message, that a sufficient number of users accepted this standard of communication, that carriers allow third party service providers to use SMS as a platform for providing new and innovative services based upon this form of communication, and that government authorities accept SMS as an acceptable form of communication, for example for voting, payment transactions or submission of citizen information. Value is created by the combined behavioral innovation of end-users, providers and authorities and illustrates the multi-sidedness of many modern service innovations. In this report, we explore three problems of particular relevance to these types of service innovations:

1. Identification of services where customer behavior is likely to influence and be a source of service innovations
2. Development of methods and measurement instruments for the identification of service innovations where customer behavior and involvement are important

3. Understanding of service innovation processes that involve multiple actors in partnerships (value networks) at the supply side

The research reported here should be considered exploratory, and our intention is that the results should provide a basis for further and more confirmatory research into the problems of customer and value network involvement in service innovation. The aim of these ongoing research efforts is to develop a framework for identifying the value creating potential of a service innovation (value creation index), the change in customer behavior required for this value potential to be released (behavioral change index), and the commercial effects of service innovations on the relationship between customer and provider (relationship index). The framework will provide normative guidelines for how to manage and support service innovation to obtain service adoption and create customer value. However, it will also provide instruments for capturing customers service perceptions, readiness, behavioral usage patterns and service innovation effects. The current research effort reported here focus on providing knowledge of service innovation processes requiring partner involvements, most notably customer involvement, by literature reviews, instrument development, and exploratory empirical studies.

1.2 Structure of the report

The remaining report is organized in four main sections. Section 2 summarizes the general service innovation framework applied in our investigations. It then reviews literature on customer related measures of service perceptions and customer involvement. Finally, literature on value network involvement and cooperative arrangements is reviewed. Section 3 presents the method of the three different research designs applied in our investigations. The three designs include the design of the Community Innovation Survey – 3 (CIS-3), a separate strategic survey on customer involvement in new service development and a set

of qualitative interviews that were conducted on customer involvement and cooperative arrangements of three different service firms. The results of these investigations are presented in section 4, but the results are organized by the two topics customer involvement and cooperative arrangements, not by individual research designs. Finally, section 5 presents our main conclusions, discusses the limitations of our work and suggests some implications for further research, managers of service firms and service networks as well as for service innovation policy.

2 THEORY AND MODELS

Classic innovation studies represent a source of knowledge on service innovation (Fagerberg, Mowery and Nelson, 2004). Until recently, however, service industries have not been focused in this research area because these industries have been considered less productive, labor intensive, less technology intensive and less innovative (Econ, 2003). In the middle of the 1990's, however, these myths were challenged by several projects investigating "services in innovation" and "innovation in services" - as one of the larger projects named their final report (the SI4S-project; Hauknes, 1999). Since then, considerable more attention has been paid to "services in innovation" than to "innovation in services". One of the reasons is that focus has been directed to knowledge and innovation intensive service sectors which are believed to play an important role in the innovation system. Much of the research has been organized around the services generally termed "knowledge intensive business services" – KIBS or "knowledge intensive service activities" – KISA (Kuuisto and Meyer, 2003; Den Hertog, 2000; Sundbo and Gallouj, 2000). For the past two years, however, "innovation in services" has gained renewed attention (Miles, 2004; Fagerberg, 2004; Von Tunzelmann and Acha, 2004), due to renewed awareness of the important role of service industries in western economies, in particular to employment.

The two main areas of service research have been service marketing and service operations/service operations management. In both of these areas, service innovations have been given some attention, but under a different name – new service development (NSD). New service development corresponds to the term new product development (NPD) in manufacturing industries, but most of the contributions in service research have stressed the differences in issues, including innovation, between manufacturing firms and service firms. The main determinant of these differences has been what is considered to be the unique

attributes of services that are not found for manufactured goods. Consequently, new service development research has mainly emphasized how new service development differs from new product development (Menor, Tatikonda and Sampson, 2002).

Few attempts have been made to investigate the differences in service innovation or new service development between different service industries, and the few attempts that have been made have used other services typologies (De Jong and Vermeulen, 2003). The reason is that the service attributes are believed to be universal to services. Most studies of differences among service industries on service attributes have focused other problems than service innovations, such as marketing, operations and distribution problems (Lovelock, 1983, Zeithaml, Parasuraman and Berry, 1985, Clemes, Mollenkopf and Burn, 2000). New service development has only been investigated as a subtopic in these studies, but preliminary findings indicate that service innovation types and processes may vary with service attributes (Clemes, Mollenkopf and Burn, 2000). Other findings indicate that studies of service innovation differences based upon service industry differences are flawed because service innovation types and processes are likely to vary considerable across firms in each service industry (Jambulingam, Kathuria and Doucette, 2005).

2.1 Service innovation framework

De Jong et al. (2003) summarize what we know of service innovation, mainly through innovation studies. The summary is organized in a framework for service innovation that is illustrated in figure 2.1.

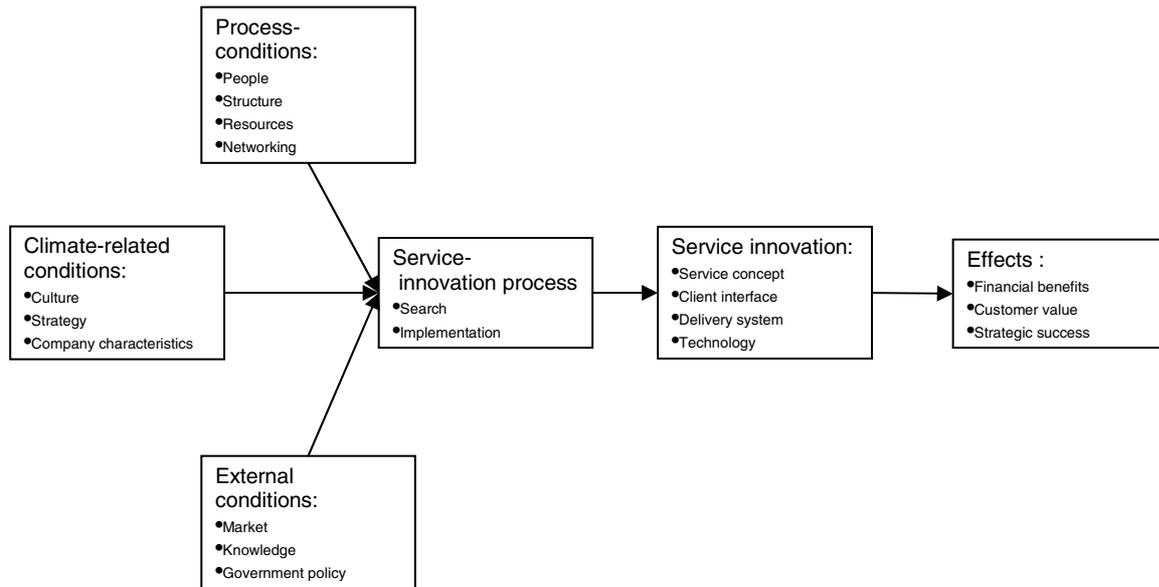


Figure 2.1. Framework of service innovation (from De Jong et al., 2003)

The framework includes four separate groups of service innovation characteristics – the characteristics of the innovation conditions, innovation processes, innovation types and innovation effects. Innovation conditions include process-related, climate-related and external conditions with corresponding characteristics shown in figure 2.1. The service innovation process is considered a rather simple, two-stage process including a search and an implementation stage. The service innovation itself may be characterized in several different ways, but in this framework, the typology of Den Hertog (2000) is used including four types of innovations in – service concept, client interface, distribution system and technological options. Innovation effects are considered to be of three different types – financial benefits, customer value and strategic success.

The basis of the framework is the service *innovation itself* where De Jong et al's (2003) suggest service innovations to differ from other innovations due to the universal attributes of services (intangibility, inseparability, heterogeneity and perishability - Zeithaml, Parasuraman and Berry, 1985). For example, service

innovation is believed to be more incremental and less radical than innovation in other industries (Johne and Storey, 1998). Service innovation is believed to be less technology based (Cooper and de Brentani, 1991) and less R&D based (Brouwer, 1997). De Brentani also suggests service innovations to be more difficult to protect and easier to copy (De Brentani, 1991). Some of these findings have also been confirmed in empirical studies of service innovation (Tether, 2003). Tether (2004, p. 7) summarizes the following main hypotheses on service innovations, which, at least partially, are supported by his empirical studies:

- Difficulty in determining the orientation of their innovation activities between products, processes and organizational changes
- More likely to claim an organizational orientation to innovation
- Less likely to acquire knowledge and technology through R&D and advanced equipment
- Less likely that their strengths in innovation lie in R&D knowledge or efficiency of production

Several studies also generally suggest service industries to be less innovative than other industries (De Jong et al., 2003), and because service innovations often include an organizational orientation it is suggested that the main barriers to service innovations are also organizational. One example is lack of relevant knowledge of service innovation in the organization (Sirilli and Evangelista, 1998).

In studies of innovation processes it is suggested that this process is less formal in service industries (Kelly and Storey, 2000). Some, such as De Jong et al., (2003), suggest the processes to be a trial-and-error process of rather ad hoc nature. Because it is difficult to determine the orientation of the innovation, it is also more difficult to identify discrete stages of the innovation process like those

suggested in traditional phase models of innovation (Booz, Allen, Hamilton, 1982). Consequently, service innovations are often believed to consist of the two partly overlapping stages of search and implementation (De Jong et al., 2003). The terms “fuzzy front end” and ”execution-oriented back end” are also sometimes used in new service development literature (Menor, Tatikonda and Sampson, 2002).

One may also suggest that because services are labor intensive, service innovations are also likely to be more labor intensive and less technology-investment intensive. As a consequence, it has been suggested that service innovation processes may more easily be terminated (De Jong et al., 2003, p. 28). Furthermore, it is suggested that the universal service attributes of intangibility etc. make communication more difficult in service innovation processes (Ennew et al., 1992). Finally, customer involvement will be more common (and essential) in service innovation processes because services are inseparable (Easingwood, 1986). Intangibility, on the other hand, may complicate customer involvement in service innovation processes. (Alam, 2002).

Of De Jong et al’s (2003) *process oriented conditions* for service innovation it is suggested that human resources are of more importance to service innovations than to innovations in other industries (De Brentani, 2001). For the structural conditions, investigations of the influence of formal collaboration and cross-functional teams have been conducted concluding that these collaborative forms are more important to service innovations (Gallouj and Weinstein, 1997). The importance of ICT as an antecedent of service innovation has achieved considerable attention. For a long time it was assumed that service innovations were less ICT-intensive because they are generally less technology-intensive. However, many service industries are significant users of ICT. For example,

recent growth in service industry productivity has been attributed to innovative use of ICT (Triplett and Bosworth, 2003) indicating that ICT currently plays a major role in service innovation. On the network oriented process conditions it is assumed that service innovations involve more interaction with business relationships, including both customers and suppliers (Kline and Rosenberg, 1986). More specific hypotheses on these interactions are reviewed in sections 2.2 and 2.3. De Jong et al. (2003) mention several climate oriented innovation conditions, but from their discussions it is difficult to dissect why these conditions should be more relevant to service innovations than to innovations in other sectors.

On the external conditions we have already mentioned the hypothesis that service innovations are based less on technology and traditional R&D. Consequently, technological growth and technological change should be of less importance to service innovations (De Jong, et al., 2003). Instead, one may expect access to people-based knowledge resources to be an important external condition for service innovation, particularly in knowledge intensive services (Den Hertog, 2000). Finally, findings consistently indicate that the government innovation support system and innovation policy do not focus the types of innovations found in many service (De Jong et al., 2003). Thus, the current government innovation policy, and in particular, current allocations of resources to institutional sources of R&D through the government innovation support system, seems to be less important to service innovations than to innovation in other sectors (De Jong et al., 2003).

Tether (2003) suggests that *innovation results* or effects are more often of a qualitative nature in service innovation. This also means innovation effects are more difficult to quantify and measure. Examples of effects which are believed to be more important are improvements in perceived customer value and

strategic effects, such as perceived service quality, and effects that are believed to be of less importance are profitability and cost efficiency (De Jong et al., 2003).

If these hypotheses on service innovation types, -processes, -conditions and – results are universal to all services or if they are more typical for specific categories of services have been given considerably less attention. A few exceptions may, however, be found, (Tether, 2003, Evangelista and Savona, 1998). Most of these studies apply service typologies to categorize differences in service innovations between service industries.

One approach to differences in service innovations may be to consider the service attributes not to be universal to all services, but varying across service categories. This approach has been followed in a series of critical articles by Lovelock and Gummesson (2004) on service marketing, but none of contributions using this approach has focused specifically on service innovation. For example, Zeithaml et al. (1985) used the service attributes to hypothesize marketing problem and strategy differences and did not focus on service innovation. The original service attributes used by Zeithaml et al. (1985) include intangibility, inseparability, heterogeneity and perishability. Later, Miles (2004) have suggested adding an information intensity attribute to these attributes. There have been some attempts to transform the service attributes into a typology of services. These have considered the service attributes to be perfectly correlated and have resulted in a one-dimensional scale indicating the “presence” of the attributes in different service categories (Bowen, 1990, Silvestro et al., 1992).

Cook, Goh and Chung (1999) have identified 39 typologies of services. 15 different uses have been identified for the 39 typologies, but service innovation

is not among these. Thus, service typologies have rarely been matched with innovation typologies. Some authors have focused on developing typologies of service innovations from applying general innovation typologies to service innovation. The most cited example is applying the Pavitt (1984) typology to services as done by Soete and Miozzo (1989). This typology has also been transformed to a service innovation typology (De Jong et al., 2003) and it has been investigated empirically (Hipp and Grupp, 2005). The typology considers services to be either supplier dominated, scale intensive, network intensive or specialized. Later, scale and network intensive services have been joined to form a category of production intensive services. The typology is resource based, and consequently, it differs considerably from the typologies developed from the original service attributes of Zeithaml et al. (1985).

Den Hertog (2000) has applied the Soete and Miozzo (1989) service typology to service innovations. Den Hertog's (2000) typology is shown in figure 2.2.

<i>Sector</i>	<i>Type</i>				<i>Paradigmatic</i>
	<i>Supplier-dominated</i>	<i>Innovation within services</i>	<i>Client-led</i>	<i>Innovation through services</i>	
Supplier-dominated	X				
Production-intensive		X	X		
Specialised services			X	X	

The typology may be used to derive hypotheses on differences in innovations across service categories. One may expect that suppliers will be a more important source of innovation in tourism, personal services and retail. In general, it is also assumed that these industries are less innovation intensive than the other service industries, but there have been few attempts to test these hypotheses (De Jong et al, 2003). The two production intensive service categories are expected to use innovation types that are more similar to those found in manufacturing industries. Examples are the use of standardization and

industrialization, and they are more likely to seek quantitative effects such as cost efficiency effects from their innovation activities. Furthermore, internal sources of innovation are believed to be important in these industries.

The largest category of specialized services is knowledge intensive business services. This industry is believed to have long term relationships with their clients, and the clients are believed to be an important source of innovation (De Jong et al., 2003). Hipp and Grupp (2005) find that the typology of Soete and Miozzo's (1998) has never been tested empirically, and consequently, the proposed relationship between the service typology and the typology of service innovations derived from it has not been tested. Hipp and Grupp (2005) attempt to test the typology, but much of their analysis ends up by investigating the differences between knowledge intensive business services and other service industries. Tether (2003) also attempts to discuss service industry differences with a basis in service typologies, but concludes that "*these simple findings raise more questions than they answer...*" (Tether, 2003, s. 490). Thus, the knowledge on systematic differences between service industries' innovation activities is limited, and requires further research.

With this general review of what characterizes service innovations and makes them different from other innovations and the limited knowledge we have on systematic differences in service innovations between service categories, we now turn to theory on the two topics focused in this report – customer involvement and collaborative arrangements in service innovations.

2.2 Customer involvement and service attributes

It is often assumed that customers are a more important source of innovation for service firms than for firms in other sectors. In an analysis of the Norwegian data from the Community Innovation Survey – 2001 (CIS-3), we could not

confirm this hypothesis, but the importance of customers as an information source and innovation partner varied significantly across service industries. Service attributes are also believed to influence customer involvement. For example, intangibility is believed to make customer involvement in new service development more difficult, whereas inseparability is believed to make customer involvement more important to service innovation success. In this section, theory and empirical studies on customer involvement in service innovations are briefly reviewed. Two models are suggested on a) the relationship between customer involvement, innovation processes and innovation results and b) the moderating effects of service attributes on these relationships. The models are used to suggest specific hypotheses on customer involvement in service innovation.

Theory and literature

Three terms used in the marketing literature are related to how customers are considered during innovation and new service development - market orientation, customer orientation and customer involvement (Slater and Narver, 1998). Slater and Narver (1998) suggest that much of the critique of firm's customer orientation is based on a misunderstanding of what being customer oriented means. They suggest replacing the term with the term market oriented characterizing market oriented firms as those that proactively seek to increase customer value by identifying latent needs of their customers. In their opinion, being customer-led is characterized by seeking customer satisfaction of expressed needs in a more responsive matter. And this approach may lead to negative effects of "*listening too carefully to their customers*" as suggested by Christensen and Bower (1996, p.198). Customer involvement, thus, is a risky approach to new service development because it implies involving customers even more directly into the process. In fact, recommendations vary from avoiding customer involvement unless firms want to risk "*loosing their position*

of industry leadership” (Christensen and Bower (1996, p.198) to giving users universal services to “*cultivate a vast pool of lay users who have the potential to make very meaningful contribution to the innovation process*” (Bar and Munk Riis, 2000, p. 103).

As seen from the citations above, customer involvement is debated and there is a slight confusion in what is meant by customer involvement. For example, the term customer may include several categories of customers, consumers and users (Kaulio, 1989). Customers may be consumers or business customers, and consumers may be end-users and/or buyers. Most often customer involvement in new product or service development means including end-users in these processes (Matthing, Sanden and Edvardsson, 2004, Alam, 2002), and there is less literature with this approach on the involvement of business customers in service innovations. A different approach is taken when investigating the involvement of business customers, and such studies are instead typically found in literature on strategic networks and alliances, for example on buyer-seller relationships (Lush and Brown, 1996). Much of this literature is reviewed in section 2.3 and we focus literature on customers as end-users here.

End-users also differ in characteristics (Gruner and Homburg, 2000). For example, there is an extensive debate on whether customers involved in new product and service development should be lead users or if lay users may also be successfully involved in these processes (Alam, 2002, Matthing, Sanden and Edvardsson, 2004).

Much of the literature on end-user involvement focuses new production development (NPD) rather than new service development (NSD). Also, Matthing, Sanden and Edvardsson (2004) point to the paradox that most of the literature on customer involvement in new service development is also published

in product development literature rather than service marketing literature. This may be explained by the NPD literature being more developed than the NSD literature.

Gruner and Homburg (2000) try to explain the impact customer interaction has on the success of new product development. Both Gruner and Homburg (2000) and Lüthje (2004) suggest the value of customer involvement depends on the characteristics and ability of the consumer, suggesting that the innovative and knowledgeable customers are of most value. Gruner and Homburg (2000) find that customer involvement in the early and later stages of the development process gives a higher success rate whereas involvement in the intermediary stages does not. User characteristics also impact on the success rate. Gruner and Homburg (2000) find that lead users and financially attractive customers, i.e. the customers that stand to contribute from the cooperation, and customers with a close relationship to the firm contribute most to increased product success. Involving only technologically interesting customers does not, however, seem to increase success. Lüthje (2004) also investigates how users' ability to innovate varies between categories of users and suggests that involving experienced users is likely to be most successful.

Customer involvement in new service development has been investigated by, among others, Alam (2002) and Magnusson et al. (2003). Alam (2002) investigates the process of involving business customers in service development in financial services industry. Alam (2002) reviews different objectives for involvement, stages of involvement, intensity of involvement and modes of involvement. The final objective of involvement is to develop a successful new service, but involvement may take many forms to reach this objective and lead to different intermediary results on the way to development success. Examples are superior and differentiated services, reduced cycle times, user education,

rapid diffusion, improved public relations and long-term relationships. Participants in Alam's (2002) study mentioned multiple objectives for involvement of customers. Customers were involved in all of Alam's (2002) 10 stages, but involvement in three of these stages, idea generation, service/ process system design and testing/ pilot run, seemed more important than the others. Alam (2002) considers intensity of the user involvement at four levels. Passive acquisition of input is when users take the initiative to provide the input. Information and feedback on specific issues is when the developers approach major service users to obtain information on specific issues at various stages of the development process. The third level is extensive consultation with users. At this level service producers take the initiative and invite users to share their knowledge and come with their inputs. The fourth and final level is the representation level. Here users are invited to join the development team and the intensity and the involvement is high. Alam (2002) concludes that the intensity of involvement seem to be most intense at the early stages of the NSD process. The modes of involvement in Alam's (2002) study are face-to-face interviews, user visits and meetings, brainstorming, user observation and feedback, phone, faxes and e-mails and focus group discussions. Of these modes, face-to-face interviews, user visits and meetings, brainstorming and user observation was most frequently used. Although Alam (2002) does not explicitly investigate the effects of involvement on success, he suggests that involvement may be a key factor in NSD processes.

Magnusson, Matthing and Kristensson, (2003) and several other Swedish authors, have taken a different approach setting up experimental studies of the effects of customer involvement. A typical design is documented in Magnusson, Matthing and Kristensson (2003) with three experiment groups involving experts or professional users, consulting users, that is, ordinary users with the possibility to consult experts, and ordinary users (without such consultation

opportunities). The general finding is that user involvement affects innovation results in the form of the quality of the ideas generated from the process, but that this effect varies with how involvement is managed. Opposing the suggestion in some of the negative literature on customer involvement in new product development, Magnusson, Matthing and Kristensson (2003) found that customer involvement lead to more original ideas and particularly so when involving lay users. One of the explanations is that lack of technological knowledge may make ordinary users focus less on technological limitations and generate ideas with more originality and user value.

A difference may be observed on the value of customer involvement in new product development versus new service development. Christensen and Bower (1996) base their skepticism on studies of the hard disk market. They suggest that several major players in this market lost their leading market position as a direct consequence of listening too closely to customers. The customers “lock” the producing firms into developing and researching only the products existing customers want. This causes the producing firms to miss new development possibilities. Bennet and Cooper (1981) are also skeptical to customer involvement. They believe the customers lack the premises to think radically new, because the customers always will choose the familiar and known. They also argue that the customers do not possess the ability to express their needs because the customers do not know the technical possibilities. The same argument is proposed by Leonard and Rayport (1997). Their proposition, however, opposes the findings of Magnusson, Matthing and Kristensson (2003) presented above. The third argument against customer involvement suggested by Bennet and Cooper (1981) is that the customers’ needs may change by the time it takes to develop a new product. This argument will always apply whether one develops a service or a product and whether the developers are experts or customers. The only way to reduce this risk is to work closely with the

customers so that one always knows the needs they possess, and so that adjustments can be made. That customers' ability to communicate information that is of relevance to new product and service development process is also suggested by Ulwick (2005). He suggests that customers tend to express solutions, specifications, needs and benefits, but that this information is of less relevance to NPD and NSD. Instead, customer involvement should be used to express outcomes relevant to customers' use of products and services, and members of the MPD and NSD teams will have to transform this information into solutions. Also, Ulwick (2005) suggests customers may be involved in evaluation of solutions developed through NPD and NSD processes.

Models and propositions

It is generally assumed that service attributes influence service innovation processes, types and results. We first focus on the effects of service attributes on customer involvement related issues of innovation processes and types. Traditional reviews of new product development processes, such as Henard and Szymanski (2001) include customer involvement as a separate element in the NPD process. For NSD processes, however, the elements are often not as easily identifiable (de Jong and Vermeulen, 2003), and customer involvement has not been considered a separate element. Still, Vermeulen and van der Aa (2003) include involvement in general as a separate element and formulate rather exploratory propositions on the importance of customer involvement in the NSD process.

Service attributes may also influence innovation types. For example, it is believed that process innovations resulting from standardization and digitization of services will be more likely for information intensive services and services that are less heterogeneous (Miles, 2004). For issues of customer involvement related to innovation types, service attributes may not be as influential as for

customer involvement related issues of innovation processes. Still it is likely that some innovation types requiring customer involvement may more easily be realized for services characterized by inseparability and heterogeneity, whereas process innovations separating consumer involvement from service production may be more easily realized for production intensive, homogeneous and standardized services (Hipp and Grupp, 2005). A simple model of the effects of service attributes on customer involvement issues of innovation processes and – types is shown in figure 2.3.

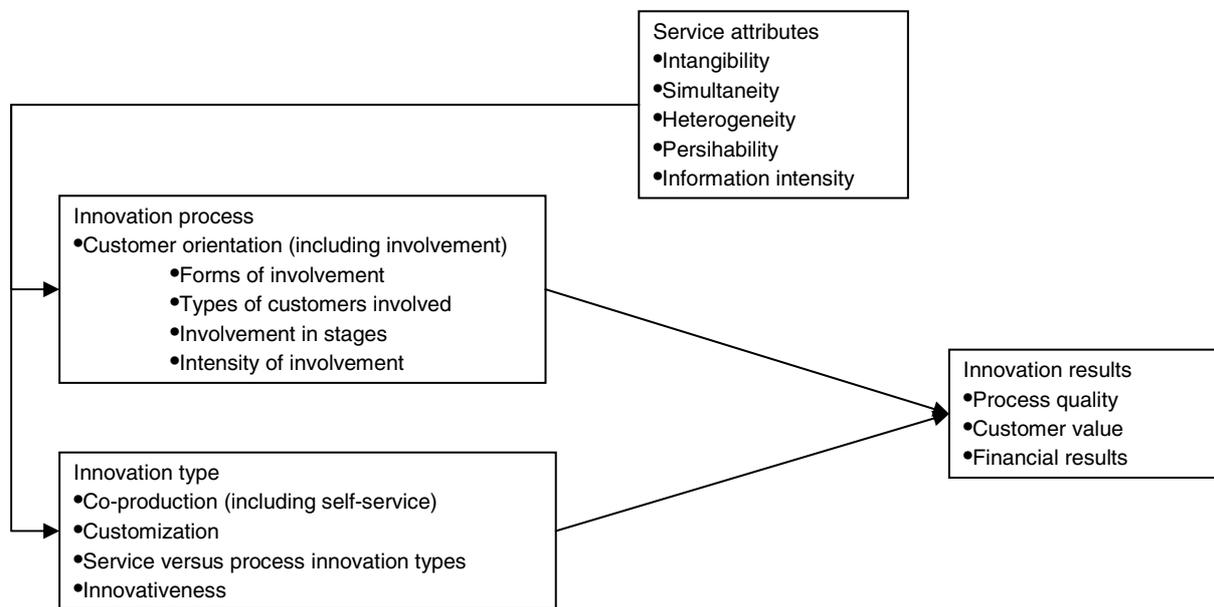


Figure 2.3 Relationships between service attributes and customer involvement issues of innovation processes and –types.

Based on the model shown in figure 2.3, a set of propositions may be put forward. Zeithaml et al. (1985) argues that intangibility makes it difficult to communicate the service and its content. This makes customer involvement in the development of new services more difficult, but also more necessary (Vermeulen and van der Aa, 2003). Other authors (De Jong and Vermeulen, 2003) have argued that due to intangibility, service innovations do not require so much investment in fixed assets, making customer involvement in NSD for intangible services less risky. Also, de Brentani (1991) suggests that

intangibility will increase customer involvement and reduce the formality of the innovation process. Thus, intangibility is proposed to have an effect on customer involvement, but the direction is uncertain.

PROPOSITION 1. Intangibility influences the intensity of customer involvement

Inseparability of service production and consumption would require customer involvement also during NSD, or NSD processes involving customers for highly inseparable services may be more likely to succeed than those not involving customers (Vermeulen and van der Aa, 2003). Self service technologies or co-production is changing the way customers interact with firms to create service outcomes (Meuter et al., 2005). Thus, services that are considered inseparable should therefore also promote innovation through co-production since the customer and service provider must be present at the same time. Thus, it is likely that for services characterized by inseparability, involvement not only in service interface innovations, but also process innovations will be more likely.

PROPOSITION 2a. Inseparability increases the intensity of customer involvement

PROPOSITION 2b. Inseparability increases customer involvement in process innovations

De Brentani (1991) suggests that heterogeneity increase the need to standardize services and that service quality in general is influenced by heterogeneity. There is a difference, however, with suggesting that it requires standardization and suggesting that it will increase the number of standardization innovations. However, it is often believed that standardization innovations may be conducted without customer involvement. On the other hand, heterogeneity increase the

importance of customer contact, suggesting that customer involvement should be more important for heterogeneous services, and particularly for innovation in the service interface. A final suggestion is made by Vermeulen and van der Aa (2003), proposing that the heterogeneity of services does make service innovations different at all.

PROPOSITION 3a. Heterogeneity increases the intensity of customer involvement

PROPOSITION 3b. Heterogeneity increases customer involvement in service interface innovations

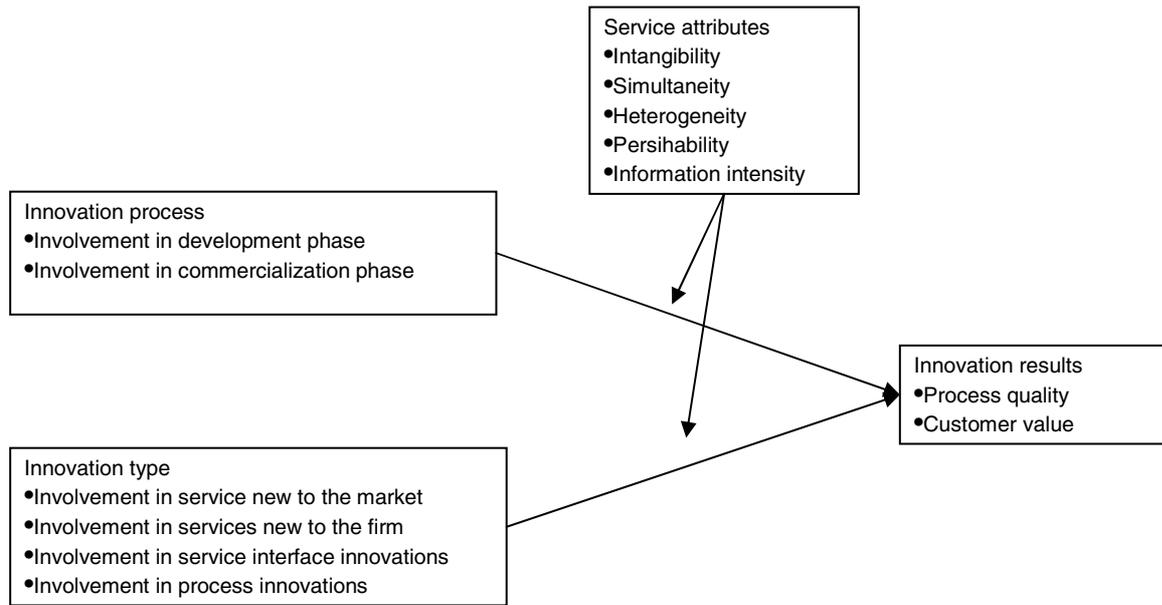
Also, for perishability, Vermeulen and van der Aa (2003) propose that this service attribute will not make service innovations different from other innovations. De Brentani (1991) on the other hand propose that perishability makes service innovations utilizing production capacity more likely during periods of low demand and innovations to extend service offerings more likely during periods of high demand. However, we have not been able to identify any particular proposals on the effects of perishability on customer involvement in service innovations. Possible effects of perishability should thus be treated in an explorative manner.

The classic service typology of Soete and Miozzo (1989) suggest that production intensive services may be information intensive or scale intensive. Information intensive services in the perspective of Soete and Miozzo (1989) and Evangelista and Savona (1998) are often fairly standardized services offered by service providers that are often heavy users of ICT. Thus, it is likely that the service innovations carried out by these providers are more often process innovations than those of other service industries. Thus, customer involvement in process innovations seems more likely in information intensive services.

Information intensity, however, is also linked to knowledge intensity so that knowledge intensive services are also likely to be information intensive. Thus, the broad literature on knowledge intensive services may also apply to information intensive services. Here, however, the focus is on information intensity rather than knowledge intensity and we propose:

PROPOSITION 4a. Information intensity increases customer involvement in process innovations.

Whereas the propositions suggested above and the model shown in figure 2.3 focus effects of service attributes on innovation process and –types, customer involvement is also believed to have direct and moderated effects on innovation results. The basic assumptions being made are that customer involvement influences innovation results, that this influence is moderated by service attributes, and that service attributes do not influence innovation results directly. These relationships are illustrated in figure 2.4.



Figur 2.4 Direct and moderated effects of customer involvement on innovation results.

The model in figure 2.4 has also been operationalized with respect to elements of customer involvement and customer orientation. We focus the effects of customer involvement in the development and commercialization stage on two forms of innovation results. For innovation types, we focus on the effects of involvement in innovations new to the market and firm (newness), and in service interface versus process innovations on the same three forms innovation results. Propositions may be developed from the same literature that we used to develop propositions 1-4 above. Two types of propositions may be developed. One type is of the direct effects of customer involvement on innovation results. The other type is the moderated effects of service attributes on the relationships between customer involvement and innovation results. We suggest direct relationship propositions first.

Three elements of customer of involvement are shown in figure 2.4 - involvement in particular phases, involvement in radical innovations and innovations in interface versus process innovations. Two possible results are

also shown – process quality and customer value. Financial results are also included in the model in figure 2.3. However, we consider financial results to be determined by the interaction of many factors over a longer period of time. Thus, process quality and customer value is focused here. Based upon the most recent literature cited above (e.g. Alam, 2002; Magnusson, Matthing and Kristensson, 2003) we propose that customer involvement has a positive effect on innovation results. Thus, we suggest the following general proposition.

PROPOSITION 5. The intensity of customer involvement affects innovation results positively.

However, when looking at more specific forms of involvement and types of innovation results, the general proposition suggested above requires modifications. Two lines of reasoning exist on customer involvement in the different phases of the development process. For example, Magnusson, Matthing and Kristensson (2003) suggest that customers may be involved early in the development, particularly to generate possible product and service ideas. The literature on customer orientation (e.g. Slater and Narver, 1998) suggest that organizations should avoid being customer-led thus, customer involvement may be more valuable in the commercialization phase. However, Ulwick (2005) assumes that customers are valuable in the earliest phases *and* in the latest phases of the innovation processes. In the early phases they identify relevant outcomes that should be improved through innovations, and in the latest phases they evaluate the value of particular outcome improvements. Also, Gruner and Homburg (2000) found the strongest performance effects for involvement in the early and latest phases of the development process, and found involvement to be of less value in the middle phases. Gruner and Homburg (2000) used a composite performance measure, and the results may be interpreted suggesting that early involvement improves other performance components than late

involvement. Due to the need for communication during new service development (Lievens and Moenaert, 2000), we suggest that early involvement improves new service development process quality. Late involvement on the other hand improves final customer value.

PROPOSITION 6a. Involvement in the development phase mainly increases the process quality of innovation projects

PROPOSITION 6b. Involvement in the commercialization phase mainly increases the customer value of innovations

The studies conducted by Magnusson, Matthing and Kristenson (2003) found that the involvement of ordinary users generated more original ideas. The same results were identified for perceived value of the ideas generated by involvement. This may indicate a relationship between originality and user value. The study referred to above investigates mobile services, and in for similar services, a relationship was also identified between innovativeness and perceived user value by Pedersen et al. (2005). It is also likely that for services that are new to the organization, involvement of customers improve NSD project communication rather than perceived value or financial results, at least on a short term basis (Lievens and Moenaert, 2000). Thus we suggest the following propositions.

PROPOSITION 7a. Involvement in innovations that are new to the market mainly increases the customer value of innovations

PROPOSITION 7b. Involvement in innovations that are new to the firm mainly increases the process quality of innovation projects

Due to intangibility of services it is difficult for customers to be meaningfully involved in innovations that do not include or externalize in some way the

interface of the service innovation (Vermeulen and van der Aa, 2003). Involvement in process innovations is thus believed to be less related to the perceived value of the final innovations, and the influence of customers from such involvement first of all leads to improved communication and process quality (Lievens and Moenaert, 2000). Thus, the following propositions are suggested.

PROPOSITION 8a. Involvement in service interface innovations mainly increases the customer value of innovations

PROPOSITION 8b. Involvement in process innovations mainly increases the process quality of innovation projects

The second set of relationships indicated by figure 2.4 is the moderated relationships between involvement and innovation results. Service attributes may moderate these relationships, but it is very difficult to find substantial literature that may be used to suggest specific propositions on these moderated relationships. Consequently, a general proposition is suggested and the possible moderated relationships are analyzed in later sections as an exploratory proposition.

PROPOSITION 9. Service attributes (intangibility, inseparability, heterogeneity, perishability and information intensity) moderate the relationships between involvement and innovation results

Service attributes may also influence innovation results directly. For example, quantifiable innovation results like cost efficiency is more easily obtained for production intensive services characterized by homogeneity and standardization (Hipp and Grupp, 2005). These potential direct relationships have, however, not been focused in this report.

2.3 Value networks in service innovation

Porter (1985) introduced the term value chain to describe the set of activities through which a product or service is created and delivered to customers. Values are accrued along a vertical set of integrated activities. The changing economics of information due to electronic networks like Internet, however, enable easier connectivity among firms and threaten to undermine established value chains in many industries. Vertically, integrated value chains are breaking up and reconfigured as value networks of cooperating firms. The concept of value networks, however, is not new. The notion that value can be created by cooperation has led managers to search for “win-win” positions as a way to enhance profitability through collaborative value creation (Ehret, 2004; Anderson et al, 1994). In the network, interactions leave the stage of dyads, giving way to multiple relationships and different roles by participating firms. The value network concept changes the focus of value creation from individual firms to the network of firms, and from optimizing one specific firm’s profit to maximizing the joint network profit generated by the service’s customer value.

Forming partnerships with other firms in innovation networks provides the opportunity for a firm to meet the increased demand for innovation and new services by distributed capabilities, that is, by sharing of resources, competencies, and costs. As Sawhney and Parikh (2001) put it: “It may now make more sense to talk about a company’s “distributed capabilities” instead of its “core capabilities””. Distributed capabilities, however, do not exclude core capabilities. Each individual firm of an innovation network has to offer unique capabilities for the network to gain competitive advantage. Distributed capabilities imply, however, that other firms enable each individual firm to focus on its core competencies to gain enhanced competitiveness (Prahalad and Hamel, 1990). Doz and Hamel (1998) argue that the need for complementary

knowledge and resources, as well as the need for sharing investments and risks, explains the high level of innovation cooperation among firms. The increased importance of innovation and the opportunities associated with alliances have turned innovation networks into an increasingly common strategy for innovations and new service developments as proved by Hagendoorn's empirical study of R&D partnerships (Hagendoorn, 2002).

Innovation-based partnerships are not without challenges. The conflicting logic between the explorative nature of innovation and the contractual dimension of alliances creates a fundamental tension (Linnarson, 2005, Bidault and Cummings, 1994). The uncertainty associated with innovation makes it difficult to structure the innovation process and to divide and formalize the division of responsibility among the partners. Furthermore, innovation involves proprietary knowledge acquisition with risks of opportunistic behavior among the participating partners without contractual agreements or trustful relationships.

Partnership in innovation is a strategic endeavor. Gulati (1998) defines strategic alliances as "voluntary arrangements between firms involving exchange, sharing, or co-development of products, technologies, or services". The formation of an innovation network starts with the decision to enter a partnership, followed by the choice of appropriate partners, and the choice of governance structure of the partnership. During the innovation process the partnership evolves through dynamic behavior of the participants. Finally, the performance of a partnership is in itself of interest, but its contribution to the performance of the innovation even more so.

In this part, we shall make a literature review of partner-based innovations. The strategic management literature on partnership/alliance research is huge. Also in the product development, in particular, the R&D-based product development

literature, partnerships and alliances are well covered. When it comes to partner-based service innovations, however, the literature on this topic is scarce.

We shall use the literature review to develop a research framework for studying partner-based service innovations. This framework is subsequently used to guide the data collection through interviews in two case studies. These case studies are explorative to uncover areas for research and theory development relevant to partner-based service innovation networks more broadly, and to further improve the existent framework on service innovations.

Theory and models

Studies of cooperative arrangements, partnerships and alliances between firms are proliferating by researchers in many different academic disciplines. “One looks in vain for a unified theory or approach to provide the basis for understanding cooperative strategy. Useful, but partial, insights can be drawn from economics, game theory, strategic management theory, and organization theory (Child and Faulkner, 1998: 17). A comprehensive review of this vast field of research is not the intention here. A useful taxonomy of issues dealt with in recent strategic alliance research includes (a) inter-organizational relationships and networks as a class of phenomenon; (b) the choice of alliances compared to alternative governance mechanisms, typically employing transaction cost theory; (c) antecedents, structure, and functions of alliances; (d) incentive issues; (e) success factors; and (f) guidelines for better management (Koza and Lewin, 1998). Following Kale et al (2000), these issues can be grouped around three theoretical frameworks: (a) a strategic framework based on market power (Porter, 1985) and resource-based view of the firm (Barney, 1981); (b) an operational perspective based on transaction cost economics (TCE) (Williamson, 1985) and resource dependence theory (Pfeffer and Salancik, 1978); and (c) innovation and learning (Doz, et al, 1989). Here, we shall give a

short introduction to three theoretical perspectives of cooperative arrangements that we consider most relevant for service innovation. The perspectives are illustrated in table 2.1.

Table 2.1 Perspectives on cooperative arrangements

Perspective	Theory	Contribution
Strategic	Market power Resource-based view	Competitive strategies - partners Complementary assets
Economic	Transaction cost economics Increasing returns/Networks	Governance models - ownership Demand externalities Supply externalities
Social	Social exchange theory Social network analysis	Strategic flexibility - trust Information channels and social embeddedness

The *strategic management* perspective draws attention to reasons or antecedents of alliance formations. Reasons range from learning; increasing competitive advantage; complementing scarce or lacking resources and competencies; risk sharing; and improving efficiency in terms of speed and costs. A firm's choice to enter into an alliance can be distinguished in terms of its motivation to exploit an existing capability or to explore for new opportunities. Koza and Lewin (1998) define two types of alliances: exploitation alliances involve the joint maximization of complementary assets, while the intent behind an exploration alliance involves a desire to discover new opportunities. Learning alliances are typical exploration alliances. The terms exploration and exploitation stem from March's work on organizational learning (March, 1991). They correspond roughly to the two major activities, search and implementation, of the innovation process described by de Jong et al (2003). In this broad category we may include Porter's market power framework (Porter1985) which offers

analytical techniques to evaluate competitive strategies, and the resource-based view of the firm (Barney, 1991) applied to alliances (Das and Teng, 2000) that offers a theory of value creation through pooling of firm resources. The focus of strategic management framework is the formation process: to choose partners. Ring et al (2005) define three critical success factors for the formation of an alliance: strong convergent interests, strong social relationships, and strong strategic relationships.

The *economic perspective* provides us with explanations of the choice of cooperative arrangement based on transaction cost economics (TCE), (Williamson, 1985). Cooperative arrangements are seen as intermediate forms between market and hierarchy (internal organization). TCE has been applied extensively to address in particular, but not exclusively, governance form in cooperative arrangements. This one-sided focus on transaction cost minimization has, however limitations, also from an economic perspective. Child and Faulkner (1998: 113) claim that “alliances may be concluded for transaction cost reasons, but networks never are. Networks generally exist for reasons stemming from resource-dependency theory - that is, one network member provides one function which is complementary to and synergistic with the differing contributions of other members of the network.” TCE does not catch the inherent economics of network markets. Two aspects of network effects are present in these markets: direct effects on the demand side increasing the customer value the more customers that are connected to the network; and indirect effects driven by the provision of complementarities on the supply side. These effects are known as the increasing-returns theory (Child and Faulkner, 1998).

In the *social* perspective we shall include social exchange theory and social network theory. Economic sociologists have shown how economic actions may

be influenced by the social context of the value network in which a firm is embedded. These networks operate on a logic which implies that the relationships among actors are shaped by their expectation and behavior. Granovetter (1985) refers to this logic as social embeddedness and stresses the importance of personal relations and structures in generating trust. One element of the social context is the structural context which highlights the significance of the social network in which a firm is placed. There are two broad approaches for examining the influence of social networks: differential informational advantage and control advantage by a firm's position in the network (Gulati, 1998). Networks may provide informational benefits through relational or structural embeddedness. Relational embeddedness stresses the role of direct cohesive ties (dyadic relationships). Actors who share direct connections with each other are likely to possess more common information about each other (also known as relational capital (see e.g. Kale et al, 2000)). Gulati (1998) emphasizes the importance of looking beyond the dyadic exchanges and define alliances in terms of social networks. Structural embeddedness goes beyond these dyadic ties and emphasizes the informational value of the structural position each partner occupy in a network context. Social connections guide the entry into new alliances. Research shows that firms turn to their existing relationships first for potential partners. In social network analysis, the position an actor occupies in the structure is a function of the actor's relational pattern in the network. Gulati (1998) applies social network analysis in discussing: the formation of alliances; the governance of alliances where emphasis is put on trust rather cost minimization; the evolution of alliances; and the performance on alliance level and on firm level. Cooperation between organizations creates interdependence between them and requires trust to succeed (Child and Faulkner, 1998). Social exchange theory suggests that two aspects of organizational context may be influential in understanding the flexibility of relationships between organizations: trust and dependence. Young-Ybarra and Wiersema, (1999)

define three components of trust: dependability, predictability, and faith. Dependability refers to expectations that the partners will act in the best interest of the alliance, predictability refers to consistency of actions by the partners, and faith refers to the belief that the partner will not act opportunistically.

Propositions on value networks in service innovations

From the three perspectives described above we can extract a number of research issues that are relevant for studying cooperative arrangements in service innovation.

Toward a taxonomy of innovation networks

Innovation networks can be characterized either in terms of the members' business relationships, members' geographical locations, or the organizational structure of the network (Hagendoorn et al, 2000). At a broad level, *members* of an innovation network can come from either the private sector or the public sector. Partners in the private sector can be characterized by their business relationships in the market - their business roles. These relationships can be vertical or horizontal where vertical refers to their position in the value chain such as suppliers and customers, and horizontal refers to business relationships across value chains such as suppliers of complementarities, competitors and consultants. The importance of customer involvement in the innovation process has long been recognized (see for instance Shaw (1994) for a summary of the advantages of this working relationship). Also cooperative arrangements with suppliers have been examined extensively, primarily in the context of transaction cost economics (make and buy decisions). The category "public sector" has to be interpreted broadly and includes governmental agencies, universities and R&D institutions. It may also be interesting to study innovation networks in terms of the *location* of the partners. This classification criterion is used by the CIS-3 study. In this study we define four location categories: local,

domestic, Nordic countries, and others. In terms of the *structure* of a network we refer to the degree of organizational integration of the partner network. This will be further dealt with in the section on governance below. Here we shall distinguish broadly between formal and informal cooperation. Bönnte and Keilbach (2005) have studied different modes of vertical cooperation for innovation and find that informal cooperation is more prevalent and more important than formal cooperation. They also found that a firm's ability to protect its proprietary innovation has a positive effect on a firm's propensity to engage in formal and informal cooperation over time. Formal arrangements can be further broken down to hierarchy or contract (Gerwin, 2004). A hierarchical network has a distinct operating entity with an authority structure, such as a joint venture, while a contractual network has formally written agreements among the members of the network. Heide (1994) distinguish between unilateral (hierarchy) and bilateral relations. Based on this brief review, a taxonomy of innovation networks is shown in figure 2.5.

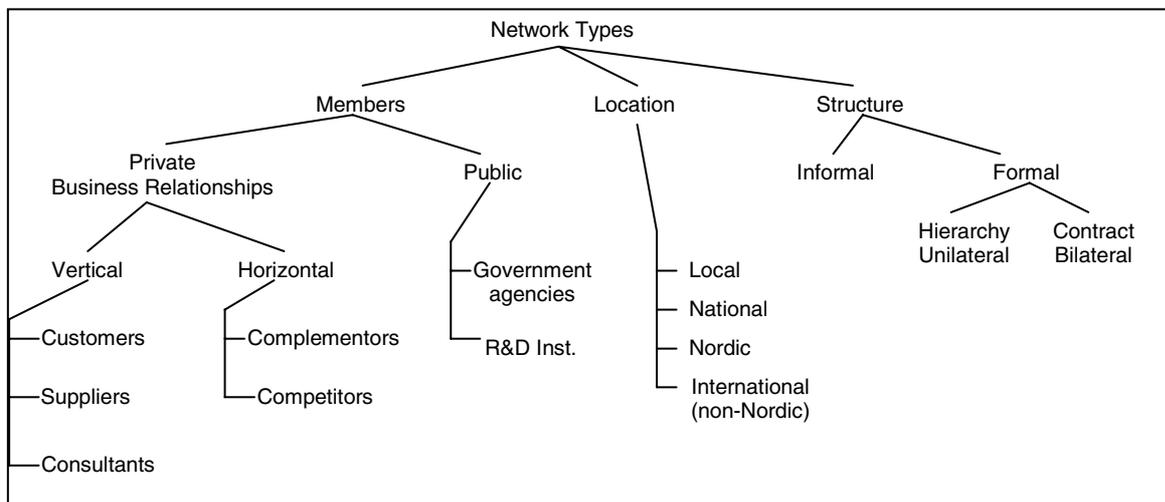


Figure 2.5. Taxonomy of Innovation Networks

Propositions may be developed from the taxonomy shown in figure 2.5. Thus, we propose the following:

PROPOSITION 1a. Non-technology-driven service firms have more informal cooperative arrangements with external partners in service innovation.

PROPOSITION 1b. Technology-driven service firms have more formal arrangements with external partners.

PROPOSITION 1c. Service firms use more vertically positioned partners than horizontally positioned partners in innovation networks

Antecedents of value network formation

Why do firms enter into value networks for service innovations? What is the motivation for a collaborative partnership? In most situations, partners ally with each other because by innovating together they hope to gain benefits they can share. A search of the literature produces an extensive list of benefits or reasons in all three theoretical perspectives. Hagedoorn and Duysters (1999) distinguish between efficiency-based networks and learning networks. Firms *learn* from their contacts: “(P)artners hope to learn and acquire from each other technologies, products, skill, and knowledge” (Lei and Slocum, 1992). A study by Allen (1988) shows that in a dynamic economic environment, learning through various contacts pays off. Doz and Hamel (1998) discuss learning as one of three main purposes of an alliance and claim that learning is a way to internalize skills, in particular skills that are tacit, collective and embedded. Another reason is the value creation potential of firm resources that are pooled together. Eisenhardt and Schoonhoven (1996: 137) view alliances as “cooperative relationships driven by logic of strategic resource needs and social resource opportunities.” The rationale here is *business strategic* and based on both transaction cost economics and the resource-based view of the firm. The business strategic aspects comprise pooling of complementary assets such as knowledge, technology or capital, sharing of risk, and efficiency aspects such as cost minimization and shorter lead time.

PROPOSITION 2a. The prevalence of learning networks in service innovations will be greater than business strategic (resource utilization) networks.

March (1991, 1995) introduces the terms exploration and exploitation. Exploration involves innovation, basic research, invention, risk taking, building new lines of business, and investments in the firm's absorptive capacity. Exploitation, on the other hand, is associated with improving and refining existing capabilities and technologies, standardization, routinization, and systematic cost reduction. A firm's choice of entering into a value network can be distinguished in terms of its motivation to explore new opportunities or to exploit existing capabilities (Koza and Lewin, 1998). In stable markets, exploitation of existing capabilities may lead to a stronger competitive position in that market. In changing competitive markets, however, exploitation strategies may negatively affect the firm's survival by creating a competency trap (Levinthal and March, 1993). von Hippel (1998) observes that attending to leading edge customers creates opportunities for firms to discover new opportunities. We assume that the competitive environment of the service sector affects the frequency with which a firm enters into value networks for service innovation.

PROPOSITION 2b. Service firms in sectors characterized by changing competitive environments will have greater incidence of innovation value networks.

The formation process

Which firms enter value networks for innovation and whom do they choose as partners?

Ring et al (2005) describe three success factors for the formation process: 1) the presence of convergent business interests and a feeling of urgency; 2) the pre-existence of social relationships; and 3) the pre-existence of strategic relationships (function of firm strategies, competitive and market conditions). Depending upon the initial positions of the partners on these factors, three different formation processes emerge: emergent, engineered, and embedded. Firms entering value networks face considerable moral hazard concerns because of the uncertainty of predictable behavior of the partners of the network. The uncertainty is further increased in rapid changing environments due to changing needs and reorientations of partners. “Sociologists have suggested that economic actors address concerns of opportunism in economic transactions by embedding transactions in the social context in which those transactions occur.” (Gulati, 1998: 300). Faced by the uncertainty about a partner, actors adopt a more social orientation and resort to choosing partners they know and already have relationship with. The social factors observed to influence this choice is an accumulation of prior alliances. Gulati has alone and in collaboration with other researchers in several studies of social networks examined the influences of social factors on alliance formations (Gulati, 1998), Gulati, 1999, and Gulati et al, 2000).

PROPOSITION 3a. Innovative service firms choose partners from their social networks and use selective entry to safeguard their exchanges.

PROPOSITION 3b. Innovative service firms choose partners from prior value networks and have more stable innovation partners.

Governance of network-based service innovation

The term governance has been broadly defined as “a mode of organizing transactions” (Williamson and Ouchi, 1981). A more elaborate definition of the concept is given by Heide (1994: 72): “(G)overnance is a multidimensional

phenomenon, encompassing the initiation, termination, and ongoing relationship management between a set of parties”. The governance structure of an alliance is the formal contractual structure participants use to formalize it (Gulati and Sing, 1999). The original framework, as developed by Williamson (1975), views the governance decision as fundamentally a choice between markets and hierarchies. Alliances, or value networks, are regarded as an intermediate form, a relational form, governed by contractual agreements among the partners. These contractual forms may vary considerably in their formal structure (Powell, 1990). Powell (op.cit.) calls them network forms. The common way of describing these various contractual forms is in terms of the degree of integration or the extent of hierarchical control elements embedded in the governance structure, such as authority, incentives, decision rules, etc. The aspects of hierarchical control have been influenced primarily by transaction cost economists. TCE provides a framework for assessing alternative governance forms based on three different exchange conditions – uncertainty, asset specificity, and frequency. Normally, the higher the uncertainty and asset specificity, and the lower the transaction frequency, the more hierarchical control is desired. Gulati and Singh (1998) find that the magnitude of hierarchical controls in contractual relationships is influenced by the anticipated coordination costs and by expected appropriation concerns. Appropriation concerns “originate from the pervasive presence of behavioral uncertainty, combined with the difficulties of specifying intellectual property rights.” (Gulati and Singh, 1998: 788). Normally, the greater the appropriation concern, the more hierarchical control is built into the alliance structure (Gulati and Singh, 1998). We expect that appropriation concerns, in particular the property right concerns, may be present in innovation alliances.

PROPOSITION 4a. Appropriation concerns in network-based service innovation drives the governance structure toward greater hierarchical control.

PROPOSITION 4b. Increased hierarchical control narrows the scope of the value network.

Several researchers have examined appropriation concerns in the presence of technology in alliances (see e.g. Pisano et al, 1988). Innovation of technology-driven services resemble product innovations where innovation tasks are separable and task interdependence can more easily be defined. For these types of service innovations, coordination costs increase. Gulati and Singh (1998) have proposed that alliances with a technology component will be organized with more hierarchical control. We know that technology-based services will be pervasive. We therefore adapt the hypothesis put forward by Gulati and Singh (1998) and propose the following proposition for service development:

PROPOSITION 4c. Information networks for technology-driven services are more likely to employ hierarchical control.

Network-based service innovation will require coordination of tasks among the members. The extent of the associated coordination costs depends on the interdependence of the tasks. The concept of task interdependence has been treated by many researchers (e.g. Thompson, 1967 and Galbraith, 1977). Of more recent studies on coordination requirements related to task interdependence and task uncertainty is found in Gerwin, (2004), and in (Linnarson, 2005) where he studies task interdependence in connection with alliance-based innovation. Value networks with more hierarchical controls are capable of providing greater coordination than those with fewer controls (Gulati and Singh, 1998). We expect that services characterized by greater information intensity require more coordination and, thus, more hierarchical controls.

PROPOSITION 4d. Network-based service innovation for services characterized by high information intensity employ more hierarchical controls.

The TCE framework implicitly treats each transaction as a discrete independent event (Doz and Prahalad, 1991) and thus limits the analysis to dyadic relationships between partners. Gulati (1998), on the other hand, claims that the TCE framework ignores the social network of economic relationships in which a transaction is embedded. The TCE framework is analytic. The inherent characteristics of services, such as intangibility and inseparability, lend themselves poorly for analytical treatment. We shall therefore propose the following proposition:

PROPOSITION 4e. Firms innovating non-technology driven services with high degree of intangibility and inseparability characteristics, promote relational embeddedness between exchange partners.

PROPOSITION 4f. Firms innovating technology-driven services promote structural embeddedness among exchange partners.

An important implication of the embeddedness of firms in social networks is enhanced trust (Gulati, 1998). Trust has been utilized in the study of joint ventures (e.g. Gulati, 1995) and interorganizational governance in marketing channels (e.g. Zaheer and Venkatraman, 1995). Young-Ybarra and Wiersema (1999) characterize trust as a construct of three components – dependability, predictability, and faith. The social exchange literature suggests that two main sources of trust exist. One is a result of reputation which can be achieved through previous relationships while the other resides in sharing values. Trust is an intermediate factor influencing the governance structure.

PROPOSITION 4g. The existence of previous relationships and shared values among partners are positively related to trust among partners in an innovation value network.

PROPOSITION 4h. Trust among partners in an innovation value network reduces coordination costs and lead to less formal governance structures.

Conflict resolution

Does network-based innovation hamper or promote the innovation process? The CIS-3 survey includes questions on whether the firms experienced difficulties with their innovation projects such as serious delays, excess costs, lack of financing, difficulties in recruiting, or keeping skilled personnel on the project. The service firms experiencing difficulties were then asked to rate the degree of importance of these difficulties. Our analysis of these data showed that, in general, the occurrence of delays, and of planned, but not started innovation projects are significantly lower for firms involved in collaborative networks. It is of interest to moderate these relationships with service characteristics to analyze variations among services.

PROPOSITION 5. The service characteristics will moderate the difficulties encountered in the innovation process for service innovation.

Performance of value networks

Performance of innovation networks can be studied on two levels – the network level and the firm level (Gulati, 1998). Performance on the firm level is closely related to the performance of the innovation and is dealt with elsewhere in this report (cf. section 2.1). How can the performance of the innovation network be measured and which factors influence this performance? Questions raised in the CIS-3 study are: are the planned objectives (time, costs, quality, etc.) reached;

did the process reach the commercialization in time; has anything been learned from the process (skill, processes, management, etc.)?

The primary approach to empirical studies of the performance of alliances has been to identify antecedent conditions to successes and failures of alliances (see e.g. Levinthal and Fichman, 1988; Kogut, 1989) Gulati and Lawrence (1997) have studied the influence of social networks and social embeddedness on alliance performance and found that alliances with more embedded tie relationships performed better and were particularly more effective in situations of high uncertainty. Lyles (1988) found a systematic difference in the cooperative capabilities of firms the more experience with alliances they have. This raises the question of whether firms with organized innovation processes and previous experience with innovation networks perform better, and whether embedded ties with partners of these networks are more developed.

PROPOSITION 6a. Innovation networks for firms with organized and continuous innovation processes have more embedded ties with their partners and perform better.

Linnarson (2005) has examined the development of alliance structures during the exploration phase of the innovation process. Based on innovation processes in the telecom sector, he identified three patterns of changes to bring alliance structure and innovation process into alignment. The first conclusion to be drawn from this study is that there is interdependency between the alliance structure and the innovation which is particularly apparent in the transformation from exploration to commercialization. Furthermore, Linnarson (2005) observes that modularity (the degree of decomposability of the innovation into modules with low interdependence) of the innovation influences the alliance structure and

that innovations that use technology to support modularization are more likely to reach commercialization.

PROPOSITION 6b. Innovation networks for services with modular architectures have smoother transitions from exploration to commercialization

3 METHOD

The propositions suggested in section 2 have been investigated using three different empirical sources. First, customer and partner collaboration in Norwegian service sectors has been analyzed using secondary data from the Norwegian version of the Community Innovation Survey – (CIS-3). Second, customer involvement has been studied through a strategic survey of selected service firms. Finally, cooperative arrangements during new service development have been investigated in two case studies including a start-up firm based on a single innovation, and an incumbent in the financial sector with an organized innovation infrastructure for multiple innovations.

Even though propositions have been suggested in section 2, the methodological approach of this study is exploratory. In addition to providing results of relevance to the suggested propositions, development of measures capturing partner involvement is also an important purpose of the study. Thus, measures from the CIS-3 data are used in new ways and new indicators of customer involvement are developed for the strategic survey reported here.

The methodological approach of the secondary CIS-3 study is briefly presented in section 3.1 with focus on the measures and indicators applied from the CIS-3 data. In section 3.2 the methodological approach of the primary customer involvement study is presented. For ease of presentation, methodological issues of the qualitative interviews are documented in section 4.3 along with the presentation of its results. All presentations are in general organized by design, sampling and measurement as separate sections.

3.1 CIS-3 study

The research design of CIS-3 is thoroughly presented in Petterson and Gundersen (2005). Some of the most relevant information to our secondary use of the data is only briefly summarized here.

3.1.1 Research design and sample

The basis for the CIS-3 study is R&D-based innovation. Thus, its data should represent the innovation activities of organizations that conduct research and development. Consequently, industries believed to conduct little research and development are not included in the population definition of CIS-3. The population of industries believed to conduct R&D-based innovation includes industries with NACE codes 05 - 51, 60 - 67 and 72 - 74. This means that the agricultural sector, forestry and the service industries retail trade, hotel and restaurant services, real estate services and all public services like administration, defense and social security services, as well as educational, recreational and environmental services are excluded from the population of relevant organizations being studied. Furthermore, R&D-activities in organizations with less than 10 employees are generally considered to be low, and thus, these organizations are not included in the CIS-3 population.

The Norwegian CIS-3 study included a stratified sample of 4682 organizations (firms), and of these, a number was found bankrupt or discontinued for other reasons at the time of the study. The final number of participants included in the sample is 4206 firms. Statistics Norway received completed or acceptable questionnaire forms from 3899 firms. Of these, 1457 firms are from the service industries, whereas the remaining 2442 are from other industries, mainly manufacturing industries. With respect to the defined population and the sampling frame and sampling method applied, the final sample is believed to be representative of the defined population. However, the way the population is

defined, the sample is not representative of Norwegian firms and organizations in general or the population of these organizations with innovation activities. Important service industries and smaller organizations are not represented in the sample, and it is highly unlikely that no innovation activities are found in these organizations. Sampling error calculations for the survey are presented in Petterson and Gundersen (2005).

Many of the innovation studies using CIS data aggregate firm level data for analyses. For example, differences between aggregated data across countries and industries are used to investigate service industry differences in innovation activities (Tether, 2003). In this study, we apply Norwegian firm-level data only. Thus, conclusions may be drawn despite variation within services because we control this important confounding source of limited validity (Tether (2003)). This is an element strengthening internal validity in our use of the CIS-3 data because it introduces random errors so that findings are challenged by random error rather than systematic bias.

3.1.2 Measures

In Petterson and Gundersen (2005) an overview of the variables included in the CIS-3 dataset is given. However, this overview does not include a traditional presentation of the theoretical basis for all measures and the arguments for their operationalization and how they relate to theoretical constructs. One of the reasons for why constructs are operationalized in the CIS variables is historical. Comparisons over time and continuity are important issues. Thus, variables in the CIS data set are only changed gradually after careful consideration in measurement committees including representatives from all the countries using the CIS questionnaires and sampling designs. Thus, a selection of variables have been used in our study, and the applied variables are treated as sampled measures from theoretical constructs found in innovation models and

frameworks, such as that of De Jong et al. (2003). The model of De Jong et al. (2003) includes four components – conditions or antecedents of innovation processes, the innovation process itself, the innovation or innovation type and, finally, the results or effects of the innovation. Characteristics of these four components are typically represented by theoretical constructs describing and explaining much of the firm-level innovation activities. However, few attempts have been made to develop measures representing these constructs in a systematic way in service innovation research. Instead, indicators already applied to capture particular characteristics of product innovation processes have been applied. Still, it is possible to organize many of these indicators within the framework of a service innovation model. Following the De Jong et al. (2003) framework, we start with variables characterizing the innovations or innovation types.

Innovation type indicators

The framework includes three elements of the service innovation itself – service attributes, innovation attributes and service innovation types. Service attributes are the characteristics of services believed to make service innovation unique and different from product innovation. Thus, variation in service attributes between services is not often an issue and measures that capture variation in service attributes have not been well developed. Service attribute measures are however, treated in section 3.2. Of the most important general innovation attributes are the degree of innovativeness. For innovation types to different bases for measurement development has been suggested. One basis is the content of the innovation. The other is who has a dominating role in the innovation. With the first basis one categorizes innovation types in innovations in service concept, service interface, distribution system, and in technological options (Den Hertog, 2000). Using the second basis one categorizes service innovation types as being supplier dominated, being innovation within services,

being client-led, being innovation through services or being paradigmatic innovations (De Jong, 2003, pp. 21-22).

When investigating the available variables in the CIS-3 dataset, the following indicators have been used and may be associated with the elements introduced above: Five items measuring degree of innovativeness, two items measuring firm level innovation intensity and 17 items measuring different innovation types. A listing of items is shown in appendix A. From the listing in appendix A we may conclude that the CIS-3 data includes a comprehensive set of indicators related to the innovation itself, even though many of the indicators mainly captures innovation types most often found in manufacturing industries.

Innovation process indicators

The framework presented above includes an innovation process model, but the components and interplay between components have not been discussed here. Service attributes are also expected to influence service innovation processes, for example by the process being more ad hoc, less formal (Tether, 2003), more influenced by and based on "soft sources" (Tether, 2003), more supplier driven, more search oriented, more continuous and involving more partners than innovation processes in manufacturing industries. De Jong et al. (2003) present departmental stage, activity stage, conversion, and response models as alternative service innovation process models. They suggest applying an activity stage model with two basic stages – a search and an implementation stage. Related to the innovation process, we identify the following indicators in the CIS-3 data: One set of items (15) measuring financial sources, one set of items (11) measuring information sources, two sets of items (4 and 8) measuring innovation process partnerships, and one item measuring termination of innovation processes. A listing of items is shown in appendix A. From the listing in appendix A we may conclude that the CIS-3 data includes relatively

few indicators of firm level innovation process characteristics. For example, indicators of process formalization or process quality (De Brentani, 1991) are not included.

Innovation condition indicators

The framework of De Jong et al. (2003) includes process related, climate related, and external factors as conditions, antecedents or determinants of service innovation processes. Process related factors include people, structural, resources and networking. Climate related factors include culture, strategy and company characteristics. Finally, external factors include market conditions, knowledge infrastructure and government policy. Related to service innovation conditions, the CIS-3 data include the following relevant indicators: One indicator (9 items) capturing general barriers to innovation, one indicator (single item) capturing industry level innovation intensity, two indicators (single items) capturing market related conditions (localization) and one indicator (3 items) capturing firm level resources gained from the governmental innovation support system. A listing of items is shown in appendix A. From the listing in appendix A we may conclude that the CIS-3 data includes relatively few and somewhat coincidental indicators of innovation conditions. For example, the indicators do not seem to have been derived from any systematic framework or model of the relationship between innovation conditions and innovation activities.

Innovation results/effects indicators

The framework of De Jong et al. (2003) presents three types of innovation results or effects. The effects are financial effects (financial benefits), customer value effects and strategic effects (strategic success). Among strategic effects are effects on growth, costs and competitive advantage. Process quality effects are not among the innovation effects, but are treated as characteristics of the

innovation process by De Jong et al. (2003). Related to service innovation results/effects, the CIS-3 data include the following relevant indicators: One indicator (3 items) capturing product oriented effects, one indicator (4 items) capturing process oriented effects, and two indicators capturing other effects such as environmental and standardization effects/outcomes. A listing of items is shown in appendix A. From the listing in appendix A we may conclude that the CIS-3 data includes relatively few and somewhat coincidental indicators of innovation effects/results as well. For example, the indicators do not seem to have been derived from any systematic framework or model and do not include traditional strategic effect indicators used in the strategy literature.

3.2 Customer involvement study

The customer involvement study was designed as a descriptive study allowing explanatory interpretations and analyses. While the CIS-3 data aim to capture R&D and innovation activities representative of such activities across a variety of industries, the customer involvement study was designed as a study particularly adapted for investigating the two relationships of the innovation models presented in section 2. Thus, samples were strategically designed to reflect variation in the service attributes shown in figures 2.3 and 2.4. Furthermore, indicators were designed to more specifically reflect the constructs included in these models, and traditional operations of these constructs, often already tested empirically, were reused. Thus, the study has a strategic design and a design that corresponds more closely with designs applied in strategy and marketing literature rather than innovation research.

3.2.1 Research design and sample

The main purpose of designing a strategic study is to be able to contrast groups or strategic samples believed to differ systematically in attributes or relationships. In this case, industries or sub-categories of industries believed to

offer services with systematic differences in service attributes were to be contrasted. One of the authors and another researcher independently categorized service industries at the four digit NACE-code level by high or low "intangibility", "inseparability", "heterogeneity", "perishability" and "information intensity". Inter rater correspondence was checked and only industry categories with 100% overlap of categorizations were explored further. Sources that would give access to firm level informants were investigated. Two sources were finally selected – industry wide firm registers found on the Internet as a source of access to the firms own website and the Norwegian Central Coordinating Register for Legal Entities. From a review of these sources we choose the sub categories of industries shown in table 3.1 to contrast differences in service attributes.

Tabell 3.1 Sub-categories of service industries.

	Low degree	High degree	
Intangibility	Lodging services	Adventure services	Low degree
Inseparability	Goods transport	Passenger transport	
Heterogeneity	Online retail and travel agencies, call centers	Physical retail and travel agencies, consultancies	High degree
Perishability	Sound studios	Local radio stations	
Information intensity	_____↑		

From table 3.1, we see that two different tourism service sub-categories were believed to differ with respect to intangibility, two different sub-categories of transport services were believed to differ with respect to inseparability and so on. Thus, sub-categories of industries were selected to control the variance in other attributes than the five service attributes being investigated. Still, variation is likely, particularly in the sub-categories used to compare the effects of "heterogeneity". However, this source of variation is likely to be unsystematic

and strengthen the validity of any significant difference findings rather than weakening their validity.

Sampling frames of informant emails were designed from the online industry firm registers and the Norwegian Central Coordinating Register for Legal Entities. From these sampling frames, judgment samples were designed to ensure sufficient variation in service attributes as shown in table 3.1 and to ensure availability and precision of the email addresses of informants representing each firm. A set of criteria was used for how many informants should be contacted. The criteria were based on pretests of response rates and cell sizes required for valid analyses. The target was to obtain minimum cell sizes of 20 observations, and an overview of the number of informants contacted and those who responded is shown in table 3.2.

Table 3.2 Respondents

Sub-category	No. in sampling frame	No. reached by email	No. showing interest	No. completed responses
Adventure services	100	95	47	21
Lodging services	100	97	26	8
Local radio stations	87	82	27	6
Sound studios	100	93	36	17
Goods transport	101	98	32	15
Passenger transport	101	99	35	20
Online retail	37	35	9	2
Physical retail	50	44	16	10
Online travel agencies	25	24	4	1
Physical travel agencies	25	25	4	1
Consultancies	50	48	13	5
Callcenters	49	47	7	3
Sum	825	787	256	109

As seen from table 3.2, the number of complete responses was 109. For some variables, the number of respondents may be greater than 109, due to partial

answers. The number of respondents is small and all results should thus, be interpreted with care. A study applying judgment sampling and strategic comparisons may still give valuable results because findings, e.g. of differences, are likely to be amplified when the number of observations is increased or more representative samples are used. Thus, the design is believed to provide data with internal validity. However, external validity may be threatened by the applied sampling method, and generalization of results should be made with great care. An important issue in this study is also the development of alternative research and sampling designs as well as multiple measures to better capturing innovation activities as alternatives to those applied in traditional innovation studies. Thus, the final design was a result of considering many factors, of which external validity was only one consideration.

A questionnaire was designed with the measures presented and discussed below. The procedure applied was to give the respondents a link to the questionnaire website. Respondents were also informed that if they replied to the email by giving us their physical address, printed versions of the questionnaire including return envelopes would be sent to their addresses. Only three respondents used this opportunity and the rest of the respondents used the online questionnaire. All respondents received one reminder encouraging them to participate. A copy of the questionnaire is shown in appendix B. For more details on procedures and measurement, see Luteberget (2005).

3.2.2 Measures

Traditional indicators using multiple items have found little use in the periodical innovation studies. This is particularly true for measures of service attributes. Instead, these attributes have been indirectly captured by selecting specific industry sub-categories for further analysis. There may however, be differences between service attributes in sub-categories of industries and (perceptions) of service attributes for each individual service provider in these sub-categories.

Consequently, we have applied “manipulation checks” in this study measuring perceived service attributes by multiple measures separately. The four service attributes of intangibility, inseparability, heterogeneity and perishability is measured applying adaptations of the measures applied by Lievens and Moenaert (2000). They apply four item indicators for each of these constructs, but due to ease of use we have reduced the number of items somewhat in our questionnaire. The service attribute information intensity has been given surprisingly little empirical attention when considering the theoretical attention given to the construct after Porter and Millar’s introduction of the term in the strategy literature (Porter and Millar, 1985). Glazer (1991) has operationalized several of the components of the theoretical construct, and our operationalization applies and adapts several of Glazer’s measures to our context. To a certain extent our measure includes items to distinguish knowledge intensity from information intensity (Autio, Sappienza and Almeida, 2000). Consequently, items capturing whether the information component of the service is easily digitized and distributed over electronic networks are also included (Griffith and Chen, 2004). Principal components analysis of the service attribute items showing their component structure and reliability is shown in table 3.3.

Table 3.3. Principal components analysis – service attribute items*.

Indikator	α -scale	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Intangibility 1		0.04	0.13	0.92	0.03	0.05
Intangibility 2	0.84	-0.15	0.08	0.90	0.12	0.08
Inseparability 1		0.81	-0.19	0.01	0.13	-0.22
Inseparability 2		0.78	-0.11	-0.10	0.00	0.21
Inseparability 3	0.77	0.83	-0.15	-0.04	-0.01	-0.21
Heterogeneity 1		0.02	0.23	0.09	0.16	0.75
Heterogeneity 3	0.50	-0.17	-0.12	0.05	0.12	0.80
Persihability 2		0.16	-0.08	0.01	0.83	0.11
Persihability 3	0.56	-0.08	-0.14	0.14	0.78	0.17
Information intensity 3		-0.12	0.65	0.29	-0.25	0.17
Information intensity 4		-0.19	0.88	-0.01	-0.06	0.09
Information intensity 5	0.79	-0.14	0.85	0.07	-0.04	-0.09

* Varimax rotation. All factor loadings above 0.4 marked. Eigenvalues (% of variance): 3.2 (25.5), 2.1 (17.1), 1.6 (13.1), 1.2 (10.0) and 0.86 (7.2)

The analysis shown in table 3.3 shows that the structure of the factor loadings reflects the expected theoretical structure with respect to convergence and discriminant validity. However, the reliability of some of the indicators is below acceptable values for confirmatory analysis (Nunally, 1978; Hair et al., 1998), but they may be applied for exploratory analyses of the kind given priority in this report.

To investigate if the providers of the services perceive the service attribute differences in the same way as that used as a basis for the sampling of service industry sub-categories, a t-test of the differences in perceived service attributes across industry sub-categories was conducted. This would also indicate if categorizations made by the typology of Zeithaml et al. (1985) and the typology addition suggested by Miles (2004) provide valid bases for our sampling design. Results from these t-tests are shown in table 3.4.

Table 3.4. Service attribute perceptions.

Variable	Sub-category	Assumption	Mean	t
Intangibility	Adventure	Low	1.6	
	Lodging	High	2.0	1.2
Inseparability	Goods transport	Low	2.3	
	Passenger transport	High	3.0	2.0*
Heterogeneity	Online retail, callcenters	Low	3.2	
	Physical retail, consultancies	High	3.7	1.6
Perishability	Sound studios	Low	3.7	
	Local radio	High	3.8	0.2
Information intensity	Adventure, lodging, transport	Low	2.6	
	Local radio, sound studios, online retail, callcenters, consultancies	High	3.5	4.1***

*, ** and *** indicate significance at 10%, 5% and 1% levels.

From table 3.4 we find that all differences are in the expected direction, but that only two of the differences are significant. In particular, it seems that information intensity is an attribute with high correspondence between pre-categorization and perceived service attributes. For inseparability, the difference is significant at the 10% level, which we consider acceptable in exploratory investigations like this one. Still, it is somewhat surprising that the much cited attributes of intangibility, heterogeneity and perishability do not seem to be perceived in the same way by those providing the services as by those theorizing about it. Similar findings have also been made by Iacobucci (1992) but these findings mainly involve goods versus service perceptions, not differences in perception across services. To control for any errors in pre-categorizations, all analyses contrasting service attributes apply perceived service attribute measures rather than our pre-categorizations.

The rest of the questionnaire was designed developing measures for the theoretical constructs included in the models shown in figures 2.3 and 2.4, with customer characteristic and innovation process indicators on one page, innovation type indicators on the next and innovation results indicators and other variables including firm characteristics on the final page. All indicators were designed as general indicators so that context relevance, for example involvement, could be added by changing the text introduction to an item section rather than changing the wording of each individual item. Thus, the indicators capture general characteristics of the innovation process, type and results as well as characteristics of the context of these elements just by altering the text introduction to each item section. In this study, the context of these elements was customer involvement, but in later applications of the developed items, the same measures may be applied either as generic measures or by providing a specific context while still remaining valid and reliable measures. To develop generic measures that could be reused in other service innovation contexts was one of the main purposes of the project in which this study was conducted. That is also why particular attention has been given to the theoretical and empirical validity of service innovation measures in this report.

In the group of innovation process related measures we have developed measures for intensity of involvement, characteristics of involved customers and degree of involvement in particular stages of the innovation process. Intensity of involvement was measured applying six items collected and adapted from Gruner and Homburg (2000). The scale showed good reliability with coefficient $\alpha=0.84$. Gruner and Homburg (2000) also developed detailed measures of the characteristics of involved customers including their technical attractiveness, financial attractiveness, closeness of relationship and lead user characteristics. The complete set of items from Gruner and Homburg (2000) was used, but here they are only considered as a collection of single item indicators since the scale

can not be considered reflective. Different process models were considered as bases for developing indicators of involvement in innovation (Booz, Allen, Hamilton, 1982, Alam, 2002). Applying the framework shown in section 2 and the set of findings summarized in De Jong et al. (2003), we expect indicators of innovation process activities to reflect a two-factor structure corresponding to the activities of open search and the closing implementation stages of the service innovation process. Nine items reflecting activities in the innovation process was applied from the service innovation literature. Three of these were rejected due to distribution problems. Analysis of the remaining six items showed the expected two-factor structure reflecting (in our context involvement in) activities of the search or development stage and the implementation or commercialization stage of the service innovation process. The complete scale of involvement showed good reliability with coefficient $\alpha=0.84$, while $\alpha=0.84$ for the development involvement scale and $\alpha=0.82$ for the commercialization involvement scale.

One of the topics requiring more theoretical discussion before operationalization is innovation types. A single page of the questionnaire was devoted to capturing these elements. The typology of innovation types most often used is that of product versus process innovation types ((Utterbach and Abernathy, 1975). Several authors have argued that organizational innovation should be included as an additional type distinct from product and process innovation types. whereas others have argued for redesigning the typology into alternative two-category typologies such as the typology of technological versus administrative innovations (Gopalakrishnan and Damanpour, 1997). Teece (1996) suggested an alternative typology of autonomous versus systemic innovation types. He describes autonomous innovations as those which “*can be pursued independent of other innovations*” (Chesbrough and Teece, 1996, p. 67), whereas systemic innovations require “*coordinated adjustments throughout the system to realize*

the gains from the innovation” (Teece, 1996, p. 219). Another typology that applies the dimension of innovativeness, radicalness or newness has been extensively discussed by Garcia and Calantone (2002, see also Chandy and Tellis, 2000). None of these discussed typologies have been developed to particularly reflect different *service* innovation types.

Looking specifically at service innovation typologies, the literature is more limited. However, we have discussed the typology of Den Hertog (2000) in section 2. This typology is also applied by De Jong and Vermeulen (2003) suggesting that service innovations may be “*innovations in the service concept, the client interface, the delivery system and [in] technological options*” (De Jong and Vermeulen, 2003, p. 845). Gadrey, Gallouj and Weinstein (1995) concluded from their qualitative studies of several service industries that service innovation typologies should be designed specifically for each service industry. They suggested one typology for financial services, one for business consultancy services and one for electronic information services which were the different service industries they investigated. Using industry specific typologies makes cross industry comparisons difficult and does not provide an acceptable basis for investigating the effects of service attributes on service innovation types. It is also possible to combine the bases for several typologies into more complex taxonomies or by designing typologies that do not use a single attribute or characteristic along each axis of the typology system. For example, Avlonitis, Papastathoulou and Gounaris (2001) suggest a typology of service innovations that includes “new to the market services”, “new to the company services”, “new delivery processes”, “service modifications”, “service line extensions” and “service repositioning” as the service innovation types. The typology is supported by empirical observations, but it is difficult to use because its underlying dimensions are not mutually exclusive.

To design a generic instrument of service innovation types we have included the most common typologies of the product innovation literature, such as that of product, process, organizational, autonomous, systemic and radical innovations as well as the particular service innovation typology of Den Hertog (2000). By combining its 23 items, the final instrument may be used as a flexible instrument capturing most of the innovation types discussed above. Of the discussed typologies, we have analyzed some in greater detail using relevant items from the instrument. A scale capturing innovativeness or radicalness of service innovations was analyzed and found to reflect a two-factor structure related to newness to the market or customers and newness to the innovating organization (newness to the firm). The complete innovativeness scale showed $\alpha=0.81$, whereas the newness to the market scale showed $\alpha=0.82$ and the newness to the firm scale showed $\alpha=0.74$. Furthermore, a scale was analyzed to capture the typology of product (service concept) versus process innovations. Again, a two-factor structure was identified showing that it is possible to typologize product versus process innovations also for service innovations. Decomposing this scale, service concept innovation types were captured using a four-item scale with $\alpha=0.81$, and process innovation types were captured using a scale of 12 items with $\alpha=0.89$. The process innovation scale could also be decomposed into multiple item scales of service distribution innovations ($\alpha=0.78$), technological process innovations ($\alpha=0.88$) and organizational innovations ($\alpha=0.92$) as well as single item measures of co-production innovations, standardization innovations and modularization innovations. For all items, we measured the involvement of customers in these innovation types. However, the items were general and other contexts could easily be applied. For example, the items may easily be modified to capture, for example, the *importance of* or *barriers to* these different innovation types.

Finally, the questionnaire included measures of innovation results. The empirical literature on service innovations revealed three components or elements of service innovation results: Process results/effects, customer value results/effects and financial results/effects. Included in the category of financial results we also find strategic results such as revenue growth, profitability growth or cost efficiencies. We have retained the three-factor structure and designed service innovation effect scales capturing these three components. Process effects are not so often discussed in service innovation literature, but are considered important due to the customer involvement focus of our study. On the other hand, financial results are often long term results of process and customer value results and should be better captured in a longitudinal study approach. Thus, we applied process result measures from adapting the items Gruner and Homburg (2000), customer value measures from the items of Pedersen et al. (2005) and financial results from the items of Joshi and Sharma (2004). Altogether, nine items were used in the complete service innovation results scale, showing a reliability of $\alpha=0.83$. Further analysis of this scale revealed a four-factor structure including four items reflecting process results/effects ($\alpha=0.70$), two items reflecting customer value effects ($\alpha=0.65$), two items reflecting strategic market effects ($\alpha=0.92$), and finally, a single item measure of profitability as the only financial effect. All items are shown in appendix B.

3.3 Qualitative interviews

A case study approach was applied in order to test the empirical relevance of the research propositions put forward in section 2.3 above. The cases chosen differ considerably in the nature of the innovation processes. Case 1, the Mobile Communication Partner, is a start-up company organized around a new-to-the-market innovation, an application of mobile communication to passengers on board ships at sea. Case 2, DnB NOR, is an incumbent in the financial service

sector with a well developed infrastructure to guide innovation developments through a structured process. Yin (2003) argues that a case-based research strategy is advantageous when “how” and why” questions are addressed while Meredith (1998) claims that one particular strength of qualitative case-based research is that the phenomenon can be studied in its natural setting and understanding can be gained through observing the actual practice. Based on these arguments we choose a case-based research for our exploratory study of the complex phenomenon of value networks in service innovation.

To guide the data collection in these case studies we used non-schedule-structured personal interviews (Frankfort-Nachmias and Nachmias, 1996) based on an interview guide (see Appendix C). The interview guide specifies topics related to the research propositions presented above. The respondents are known to have been involved in the particular innovation processes. The interviews focused on these subjects’ experience of the innovation processes which guided to some extent the procedures followed through the interview guide. The interviews were tape recorded. For each innovation process only one respondent was used. Thus, the value networks were not fully explored in these studies which is obviously a limitation.

4 RESULTS

Results from the different analyses and studies are reported in the following way: In section 4.1, we present some general results reflecting differences in service attributes on innovation processes, innovation types and innovation results. These results are based on simple analyses of the CIS-3 data set presented in section 3.1 and focuses *service industry differences* in customer involvement and cooperative arrangements. In section 4.2 we report the results from analyzing the primary data of the customer involvement study presented in section 3.2. These results include the *effects* of service attributes on *customer involvement*, the direct effects of customer involvement on innovation results and the moderated effects of service attributes on the relationship between customer involvement and innovation results. Finally, in section 4.3, results from analyzing the CIS-3 data with particular focus on the *effects of cooperative arrangements* in service industries as well as the results from the qualitative interviews described in section 3.3 on cooperative arrangements are presented and summarized.

4.1 Service characteristics and service industry differences

Even though the relevant variables of the CIS-3 data listed in appendix A allow comparisons of service and manufacturing industries as well as comparisons across service industries for elements of the innovation processes, types and results, this section focuses analyses of differences in customer involvement and cooperative arrangements. For more detail on analyses of service industry differences in general based on these data, we refer to Pedersen (2005).

The CIS-3 data includes no measures of innovation types involving customers in particular or innovation types including cooperative arrangements, but the variables measure more directly the importance of customers and other sources of information of relevance to the innovation process as well as the use of

cooperative arrangements including specific partners during innovation processes. Thus, these two groups of indicators are used here – the importance of information sources and the importance of collaboration with specific partners in innovation processes. We first investigate any differences in these groups of indicators between service and manufacturing (other) industries. In the category of manufacturing (other) firms, all firms not belonging to service industries are grouped. However, only a marginal share of these firms has been sampled from non-manufacturing (e.g. fishing and mining industries – NACE codes 05-15). Consequently, we term these manufacturing (other) firms. In table 4.1 significant results from analyses of variances of differences in mean importance of information sources between service and manufacturing (other) firms are shown.

Table 4.1. Importance of information sources

Variable	Category	N	Mean	F
Own corporation/ enterprise	Non-service	780	1.4	
	Service	416	1.6	F=6.2*
Commercial R&D firms	Non-service	1176	0.6	
	Service	669	0.4	F=43.2**
Universities	Non-service	1092	0.8	
	Service	589	0.6	F=11.0**
R&D institutions	Non-service	1092	0.8	
	Service	589	0.6	F=25.6**
Exhibitions etc.	Non-service	1092	1.4	
	Service	589	1.1	F=44.1**

* and ** indicate significance at the 5% and 1% levels.

Table 4.1 shows mean importance of information sources in the innovation process where a source that has not been used has an importance of zero. Only significant results are shown, so the results indicate that information sources within the enterprise are more important to service firms, whereas traditional R&D information sources like R&D firms, universities and R&D institutions are more important to manufacturing (other) firms. These findings correspond to previous findings of service innovation (Tether, 2003). The suggestion that service firms consider customers as more important information sources to

innovation processes than manufacturing (other) firms is not supported by our analyses of the CIS-3 data ($F=1.15$, $df=1$). The suggestion that service firm's innovation processes are more supplier dominated does not seem to be supported ($F=3.2$, $df=1$), at least not if this suggestion implies suppliers to be more important information sources of innovation in service firms.

Cooperative arrangements may be seen as a determinant or antecedent of innovation process activities or as a characteristic of the innovation process itself. Here, we apply the second of these approaches. Analyses of the extent of cooperative arrangements in service versus manufacturing (other) firms, we find that there are no differences in the extent of these arrangements in the two industry categories ($\chi^2=0.6$, $df=1$). More comprehensive analyses of the individual indicators have been conducted applying the same approach as that shown in table 4.1. However, only firms involved in cooperative arrangements have answered this part of the CIS-3 questionnaire. Significant findings are reported in table 4.2.

Table 4.2. Importance of cooperative arrangements

Variable	Category	N	Mean	F
Commercial R&D firms	Non-service	1176	0.8	
	Service	669	0.4	$F=19.2^{**}$
Universities	Non-service	1092	1.0	
	Service	589	0.7	$F=12.5^{**}$
R&D institutions	Non-service	1092	1.2	
	Service	589	0.7	$F=20.7^{**}$

* and ** indicate significance at the 5% and 1% levels.

The findings from the analyses of information sources are almost duplicated for cooperative arrangements. They indicate that it is only for the traditional research partners that significant differences in the importance of cooperative arrangements are found. Again, cooperative arrangements including these partners are considered more important in manufacturing (other) firms than in service firms. Again, no significant differences may be found in the importance

of cooperating with customers ($F=2.4$, $df=1$) and suppliers ($F=0.1$, $df=1$). The findings indicate that there are no differences in the general use of cooperative arrangements but that the types of cooperative arrangements seem to differ between service forms and manufacturing (other) firms. Still, these differences do not seem to be as extensive as those to be expected from the service innovation literature.

Investigating differences across service industries, table 4.3 shows the results of analysis similar to those reported in table 4.1 for the mean importance of different information sources. Again, only significant results are shown.

Table 4.3. Importance of information sources

Variable	Industry	N	Mean	F
Own firm	Retail	91	1.8	
	Transport	86	2.2	
	Telecom	32	2.5	
	Financial.	91	2.1	
	IT	176	2.6	
	Bus. services	111	2.5	$F=13.2^{**}$
Suppliers	Retail	74	1.5	
	Transport	63	1.6	
	Telecom	29	1.8	
	Financial.	63	1.8	
	IT	129	1.4	
	Bus. services	58	1.3	$F=3.5^{**}$
Customers	Retail	91	1.8	
	Transport	86	1.3	
	Telecom	32	1.8	
	Financial.	91	1.7	
	IT	176	2.4	
	Bus. services	111	2.0	$F=14.4^{**}$

cont...

Table 4.3. Importance of information sources cont...

Variable	Industry	N	Mean	F
Competitors	Retail	91	1.0	
	Transport	86	1.0	
	Telecom	32	1.3	
	Financial.	91	1.4	
	IT	176	1.4	
	Bus. services	111	1.1	F=3.8**
Consultancies	Retail	96	0.9	
	Transport	133	0.7	
	Telecom	35	0.7	
	Financial.	103	1.2	
	IT	175	1.0	
	Bus. services	123	0.7	F=4.4**
Commercial R&D firms	Retail	96	0.5	
	Transport	134	0.3	
	Telecom	36	0.5	
	Financial.	104	0.2	
	IT	175	0.3	
	Bus. services	124	0.6	F=4.7**
Universities	Retail	91	0.6	
	Transport	86	0.5	
	Telecom	32	0.5	
	Financial.	91	0.4	
	IT	176	0.6	
	Bus. services	111	0.9	F=5.6**
R&D institutions	Retail	91	0.7	
	Transport	86	0.5	
	Telecom	32	0.4	
	Financial.	91	0.3	
	IT	176	0.5	
	Bus. services	111	0.9	F=6.0**
Conferences, journals	Retail	91	1.4	
	Transport	86	1.1	
	Telecom	32	1.4	
	Financial.	91	1.2	
	IT	176	1.6	
	Bus. services	111	1.5	F=4.1**
Exhibitions etc.	Retail	91	1.5	
	Transport	86	0.9	
	Telecom	32	1.1	
	Financial.	91	0.6	
	IT	176	1.3	
	Bus. services	111	1.0	F=10.6**

** indicates significance at the 1% level.

From table 4.3 we find that there are systematic differences across service industries for all the information source variables except for enterprise wide

sources. Different variable reduction techniques have been applied to explore these findings. The analyses indicate a pattern of differences that is similar for all institutional information sources. This may also be identified from table 4.3 showing that business services are the main user of institutional sources like universities and R&D institutions. The rest of the variables seem to be rather unique. We find that all industries find internal sources important, but telecom, IT and business services find them most important and retail finds them least important. We find that telecom and financial services seem to be the two most supplier driven service industries. IT is unique by indicating customers as being of great importance. The significant differences for competitors are due to low importance of this source for retail trade and transport. Financial services seem to be the industry relying most on consultants, but the finding may also be explained by the low importance of consultants for transport firms. Finally, retail trade, telecom and IT firms find exhibitions more important than other firms. Any general pattern of service industry categories is difficult to identify. It seems that the use of different information sources is rather unique to each service industry. For more analyses of how service industries may be categorized using these variables, we refer to Pedersen (2005).

Significant results for the corresponding analyses of cooperative arrangements are shown in table 4.4.

Table 4.4. Importance of cooperative arrangements

Variable	Industry	N	Mean/percent	F/ χ^2
Suppliers	Retail	30	1.9	
	Transport	32	2.2	
	Telecom	15	2.2	
	Financial.	43	2.2	
	IT	52	1.2	
	Bus. services	54	1.5	F=5.4**
Customers	Retail	31	1.8	
	Transport	30	1.4	
	Telecom	14	1.6	
	Financial.	38	1.0	
	IT	53	1.8	
	Bus. services	51	1.7	F=2.4*
Consultancies	Retail	31	1.0	
	Transport	30	1.4	
	Telecom	15	0.9	
	Financial.	41	1.6	
	IT	52	0.8	
	Bus. services	44	0.9	F=3.4**
Commercial R&D firms	Retail	29	0.8	
	Transport	29	0.8	
	Telecom	14	0.1	
	Financial.	38	0.0	
	IT	50	0.2	
	Bus. services	50	0.7	F=5.9**
Universities	Retail	29	0.6	
	Transport	29	0.7	
	Telecom	14	0.3	
	Financial.	39	0.4	
	IT	51	0.4	
	Bus. services	51	1.4	F=7.2**
R&D institutions	Retail	29	0.9	
	Transport	30	0.8	
	Telecom	14	0.1	
	Financial.	38	0.3	
	IT	51	0.5	
	Bus. services	51	1.2	F=4.9**
Any cooperation	Retail	92	39.1%	
	Transport	86	40.1%	
	Telecom	32	46.9%	
	Financial.	91	53.8%	
	IT	176	31.8%	
	Bus. services	111	54.1%	$\chi^2=19.8^{**}$

* and ** indicate significance at the 5% and 1% levels.

From table 4.4 we find that the number of observations in the CIS-3 data is somewhat low. Consequently, we have added a variable indicating the percentage of firms that has any cooperative arrangement during the innovation process. For this variable we find high percentages of cooperative arrangements in telecom, business services and particularly in financial services, retail trade and transport with moderate percentages, and surprisingly low percentage of cooperative arrangements in IT firms. Looking more closely at the partners of these arrangements, we find that business services collaborate with institutional partners, financial services and transport collaborates with consultancies, and surprisingly little with customers. We also find that IT and business services collaborates little with supplier partners. The general pattern is, not surprisingly, rather similar to the pattern for the importance of different information sources.

To summarize the findings from these analyses, we have found that institutional sources of information are less important to service firms. This corresponds to similar studies in other countries (Tether, 2003). We also found that customers and suppliers were not found to be more important to service firms, contradicting what is often proposed in theoretical studies of service industries (De Jong et al., 2003). We also found that the same pattern when analyzing cooperative arrangements with partners instead of information sources.

When investigating across service industries differences in mean importance of information sources and partners of cooperative arrangements, surprisingly many significant differences were identified. For customer involvement it is important to note that customers seem to be a more important information source in specialized services (business services and IT) and that for some industries customers were an important information source but not an innovation partner. This was particularly the case in financial services. We also found that

some service industries were more involved in partnerships with institutional partners. This was particularly the case for business services. Furthermore, only some of the service industries seemed to be supplier dominated, so that to categorize all service industries among the supplier dominated industries do not seem to be appropriate. Finally, the pattern of information sources and cooperative arrangement partners was difficult to categorize in sub-categories of service industries. Consequently, the partners included in cooperative arrangements of service innovation seem to be rather unique to each of the service industries studied here.

4.2 Customer involvement

While the results reported in 4.1 were based on analyses of the CIS-3 data from Norwegian service firms, it was obvious that a deeper understanding of the importance of customer involvement in service industries required additional data. The primary study presented in section 3.2 was conducted to provide relevant data. The design of this study was aimed at providing contrasting data on differences across different service firms' customer involvement practices and the data should be interpreted as a first exploration of these differences. A set of propositions was suggested in section 2, based on two different models. The first model, presented in figure 2.3, suggested service attributes as a basis for how customer involvement and its importance are likely to differ across service industries or sub-categories of service industries. The second model, presented in figure 2.4, suggested direct relationships between customer involvement and innovation results as well as moderating effects of service attributes on these relationships. In the following presentation, these propositions are discussed referring to analyses of the primary data from the customer involvement study. Being propositions, we aim to indicate that these results should be treated as exploratory rather than confirmatory tests of the propositions as formal hypotheses.

We first present results on the effects of service attributes on customer involvement. The following propositions were forwarded in section 2 on these relationships:

PROPOSITION 1. Intangibility influences the intensity of customer involvement

PROPOSITION 2a. Inseparability increases the intensity of customer involvement

PROPOSITION 2b. Inseparability increases customer involvement in process innovations

PROPOSITION 3a. Heterogeneity increases the intensity of customer involvement

PROPOSITION 3b. Heterogeneity increases customer involvement in service interface innovations

PROPOSITION 4a. Information intensity increases customer involvement in process innovations.

All these propositions may be investigated by regression analyses of the relationship between service attributes and the seven variables on customer involvement in innovation process activities or different innovation types presented in section 3. Due to the exploratory nature of this study, we present all results here, not just those that reflect the propositions above. The results are shown in table 4.5. For each regression model, all service attributes have been included in the model.

Table 4.5 Effects of service attributes on involvement

Dep. variable	Indep. variables	β	N	R ² -justert
Intensity of involvement	Intangibility	0.20**	117	13.5%
	Inseparability	0.17**		
	Heterogeneity.	0.21**		
	Persihability	0.11		
	Info. intensity	0.00		
Involvement in development	Intangibility	0.10	117	11.7%
	Inseparability	0.11		
	Heterogeneity.	0.17**		
	Persihability	0.18**		
	Info. intensity	-0.06		
Involvement in commercialization	Intangibility	0.06	117	0.03%
	Inseparability	0.14		
	Heterogeneity.	0.09		
	Persihability	0.15		
	Info. intensity	0.05		
Involvement in market innovation	Intangibility	0.07	117	4.8%
	Inseparability	0.14*		
	Heterogeneity.	0.16**		
	Persihability	0.06		
	Info. intensity	0.14		
Involvement in firm innovation	Intangibility	0.14	117	8.2%
	Inseparability	0.21***		
	Heterogeneity.	-0.12		
	Persihability	0.19**		
	Info. intensity	0.15		
Involvement in service concept (product) innovation	Intangibility	0.03	107	13.1%
	Inseparability	0.18**		
	Heterogeneity.	0.19***		
	Persihability	0.12		
	Info. intensity	-0.02		
Involvement in process innovation	Intangibility	0.09	107	6.8%
	Inseparability	0.16**		
	Heterogeneity.	0.05		
	Persihability	0.14*		
	Info. intensity	0.16**		

*, ** and *** indicate significance at 10%, 5% and 1% levels.

From table 4.5 we find that for all aspects of customer involvement except for involvement in commercialization, at least two service attributes influence each involvement variable significantly. We also find that for all models except the model for involvement in commercialization, explained variances are surprisingly high because the service attributes explain between 5 and 14

percent of the variance in involvement. To compare, similar models including revenue and size of the firm were computed, but none of these models showed explained variances above five percent.

We find that inseparability is significant in 5 of the 7 analyses, heterogeneity in 4 of 7 analyses, perishability in 3 of 7, and that information intensity and intangibility are only significant in 1 of the 7 analyses each. Thus, it seems that inseparability, heterogeneity and perishability most strongly influence customer involvement in service innovations. This is not surprising because all these three attributes reflect the degree of customer contact in service offerings. Thus, service attributes that reflects the degree of customer contact seem to be relevant to understand variation in service innovation processes and –types. A closer look at the data reveals that providers of heterogeneous and perishable services seem to involve customers more closely during development, but similar results are not found for involvement during commercialization.

Referring to the propositions 1 through 4 listed above, we find that all propositions except 3b was supported if tested as formal hypotheses. Propositions 3b suggesting that heterogeneity increases customer involvement in service interface innovations could not be tested, but the variable capturing service concept innovations may proxy for service interface innovations. In that case, a formal hypothesis based on proposition 3b would also be supported. In general, the findings indicate that service attributes are influential determinants of involvement in service innovation.

The findings also indicate that the relationship between service attributes and other elements of service innovation than customer involvement should be further analyzed. Examples of such elements are the degree of formalization, the importance of particular innovation activities, innovation types like

standardization or interface innovations, and cooperative arrangements. Some analyses of the effects on cooperative arrangements are reported in section 4.3. For further analyses we also refer to Pedersen (2005) and Luteberget (2005).

Propositions on the direct relationships between customer involvement and innovation results were based on the theoretical relationships of figure 2.3. The propositions we suggested in section 2, may be summarized as:

PROPOSITION 5. The intensity of customer involvement affects innovation results positively.

PROPOSITION 6a. Involvement in the development phase mainly increases the process quality of innovation projects

PROPOSITION 6b. Involvement in the commercialization phase mainly increases the customer value of innovations

PROPOSITION 7a. Involvement in innovations that are new to the market mainly increases the customer value of innovations

PROPOSITION 7b. Involvement in innovations that are new to the firm mainly increases the process quality of innovation projects

PROPOSITION 8a. Involvement in service interface innovations mainly increases the customer value of innovations

PROPOSITION 8b. Involvement in process innovations mainly increases the process quality of innovation projects

The propositions refer to three elements of innovation results. Proposition 5 refers to the general innovation results including process, customer value and financial results, whereas the rest of the propositions individually refers to process or customer value results or effects. Because three dependent and seven independent variables are involved in these propositions, providing results for all possible regressions may seem somewhat too explorative and be interpreted

as “fishing” for results. Thus, for the relationships between involvement and innovation results, we analyze each proposition more directly.

Proposition 5 was investigated in a regression analysis of the relationship between intensity of involvement and the composite innovation result measure presented in section 3. The results show that innovation results as measured by a composite results indicator are not influenced by customer involvement ($\beta=0.12$, $t=1.17$, $df=100$). Thus, there does not seem to be a general and unmoderated relationship between customer involvement and general innovation results.

However, customer involvement may have moderated and/or partial effects on innovation results. Propositions 6 through 8 suggest such partial relationships. Propositions 6a and 6b were investigated computing two regression models including the effects of involvement in development and involvement in commercialization on process quality and customer value, respectively. The results of the first model show that involvement in development does not influence process quality positively ($\beta=-0.01$, $t=-0.12$, $df=99$). The results of the second model show that involvement in commercialization does not influence customer value positively ($\beta=0.17$, $t=1.64$, $df=99$). However, the results show that involvement in development influence customer value positively ($\beta=0.28$, $t=2.68$, $p<0.01$, $df=99$). This effect was not proposed, but it corresponds very well with the recent findings in Magnusson, Matthing and Kristensson (2003) and suggestions by Alam (2002). Thus, involvement in development seems more important to the customer value of service innovations than involvement in commercialization.

Propositions 7a and 7b were investigated in a similar way estimating two models including the effects of involvement in innovations that were new to the market and new to the firm on innovation customer value and process quality,

respectively. The results of the first model show that involvement in innovations that are new to the market improves customer value ($\beta=0.38$, $t=3.90$, $p<0.01$, $df=99$). This corresponds to proposition 7a suggested by service innovation literature. The results of the second model show that involvement in innovations that are new to the firm does not improve process quality ($\beta=-0.01$, $t=-0.1$, $df=99$). However, involvement in innovations that are new to the market improved process quality ($\beta=0.27$, $t=2.60$, $p<0.05$, $df=99$). Again, this was another surprising finding, not corresponding to what was originally proposed. Thus, it seems involving customers in innovations that are new to the market not only improves customer value but also process quality of innovation processes.

Finally, propositions 8a and 8b were analyzed by estimating two models including the effects of involvement in interface and process innovations on customer value and process quality, respectively. The results of the first model show that involvement in service interface innovations significantly improves the customer value of innovations ($\beta=0.39$, $t=3.75$, $p<0.01$, $df=99$). For this model, explained variance is as high as 22%, indicating that not only is there a significant relationship, but also that variation in customer value to a large extent may be explained by involving customers in service interface innovations. This corresponds to proposition 8a, and suggestions from service innovation literature. The results of the second model show that involvement in process innovations just significantly influences process quality ($\beta=0.20$, $t=1.70$, $p<0.10$, $df=99$). However, the level of significance is only 10% and the explained variance of this model is as low as 2%. Still, for an exploratory investigation it supports proposition 8b.

Consequently, 3 of 7 propositions on the direct relationships between customer involvement and innovation results are supported by our analyses. There does not seem to be a general effect of customer involvement on innovation results.

However, particular forms of involvement, such as involvement in innovations that are new to the market and innovations in service interfaces are particularly important to customer value of innovations and process quality of innovations processes.

The final proposition of section 2 suggests that the relationships between customer involvement and innovation results are moderated by service attributes. However, the proposition is not specific on how this moderation takes form (which service attributes) and which relationships between dependent and independent variables are moderated by service attributes. We have estimated eight regression models to analyze propositions 1 through 4 and seven models to analyze propositions 5 through 8. Thus, investigating the moderated effects of service attributes includes investigating the moderating effects of five moderating variables in 15 regression models. The analyses were conducted by introducing main and interaction terms of each of the five service attributes and the independent variables in each of the 15 regression models. None of the interaction terms were found significant. Thus, this strong finding indicates rather consistently that the relationships between customer involvement and innovation results identified above are universal to all service industries, and are not moderated by service attributes.

To summarize the findings on the relationships between customer involvement and innovation results, involvement does not universally improve innovation results. However, involvement may improve innovation process quality and customer value of innovations. In particular, involvement in innovations that are new to the market and in service interface innovations is important to improve both process quality and customer value. These relationships seem universal to all service industries and do not vary with service attributes.

4.3 Value network involvement and collaborative arrangements

This section on value network involvement and collaborative arrangements is based on two data sets. In section 4.3.1 data from the CIS-3 study is presented and in section 4.3.2, primary data from the case studies presented.

4.3.1 Cooperation for innovation – an empirical analysis of CIS-3 data¹

This section examines the response to the Norwegian CIS-3 innovation survey to investigate the patterns of cooperation between service firms and external partners in their innovation activities. Our analysis covers firms in the service sectors only, altogether 1457 firms in the sample. Of these 1457 service firms, 39% or 568 firms reported to have some sort of innovation activity.

A definition of ‘innovation cooperation’ is given in the questionnaire: “By innovation cooperation means active participation in joint R&D and other innovation activities with other organizations (either other enterprises or non-commercial institutions). It does not necessarily imply that both partners derive immediate commercial benefits from the venture. Pure contracting out work where there is no active participation from both partners, is not included”.

The independent variable in our analysis is the presence or absence of cooperative arrangements for innovation between firms and external partners measured by the response to the following question in the questionnaire: *Did the firm have innovation cooperation with other firms or institutions between 1999 and 2001?* This variable is mapped to the variables innovation types, partner types, and innovation process features. The effects of cooperative arrangements on these variables are analyzed and reported here.

¹ SPSS calculations have been done by research scholar Leif Jarle Gressgård

Innovating firms with cooperative arrangements

Of the 568 firms identified as innovating, nearly half (44.2%) or 251 firms claimed to have some form of cooperative arrangement for innovation. Of these only 13 had cooperative arrangements for innovation within own enterprise group, but 238 (41.9) had cooperative arrangements with external partners. These figures are amazingly similar to data reported from the UK CIS-2 survey reported in Tether (2002). Besides the category “Others” which includes primarily consultants, suppliers and customers were the most widely engaged cooperation partners (see Table 4.6).

Table 4.6 Innovative firms with cooperative arrangements for innovation

Partner Type	N	Amongst the innovating firms (%)
Any cooperation	251	44.2
Any <i>external</i> partner	238	41.9
Customers	129	22.7
Suppliers	162	28.5
Competitors	45	7.9
R&D Institutions	79	13.9
Universities	71	12.5
Others	176	31.0

Legend: R&D Institutions include “commercial laboratories / R&D-firms” (N = 38, 6.7%) and “government or private research institutes” (N = 64, 11.3%). “Others” includes “consultants” (N = 104, 18.3%) and “other firms within same enterprise” (N = 130, 22.9%).

The figures in Table 4.6 are computed from the response to the questionnaire, which, as already mentioned, is biased in several respects. No attempt has been made to adjust the response to make it representative of the service industry in Norway. We shall now present the effects of cooperation for innovation on innovation type, partner type, and innovation process features. The analyses are based on Chi-square tests and Analysis of variance (ANOVA) using SPSS.

Effects of cooperation on innovation type?

The questionnaire differentiates between three innovation types: a) services that are new or significantly improved to the market; b) services that are new or significantly improved to the firm; and c) new or significantly improved processes.

- In general, companies that are involved in cooperative arrangements introduce products that **are new to the market** more often than companies that are not involved in cooperative arrangements (Chi-square=8.54, $p=0.01$). The relationship is relatively weak ($\Phi=0.12$). When conducting analysis split on service categories, we find significant associations (Chi-squares=7.57, $p=0.01$ and chi-square=14.83, $p=0.00$ respectively) for wholesale and IT/Telecom service sectors. The strengths of the relationship are .29 and .27 (Φ -values). We find no significant associations for the transport, financial, and business service sectors.
- In general, companies that are involved in cooperative arrangements seem to introduce products that are **new to the firm** more often than companies that are not involved in cooperative arrangements (Chi-square=5.00, $p=0.03$). However, the relationship is weak ($\Phi=0.09$). Split on service categories, we find a significant association between innovation cooperation and new to the firm services for transport services only (Chi-square=6.26, $p=0.01$). The association is relatively weak ($\Phi=0.27$).
- In general, companies that are involved in cooperative arrangements adopt new or significantly improved **processes** more often than companies that are not involved in cooperative arrangements (Chi-square=4.46, $p=0.04$). The relationship is weak ($\Phi=0.09$). Split on service sectors we find a significant association between the variables only in the wholesale sector (chi-square=4.56, $p=0.03$). The strength of the association is .22 (Φ).

Effects of customer cooperation

Of the 251 service firms that were involved in cooperative arrangements, 129 firms reported to have cooperated in this activity with their customers. Here we map the frequency of the innovation type with the mean value of customer cooperation?

- In general, firms that innovate in cooperation with customers introduce more **new-to-the-market** services compared to firms that are not involved in customer cooperation. (Adjusted residual=1.9, chi-square=3.79, p=0.052). The relationship is relatively weak (Phi=0.13). Analysis of variance (ANOVA) shows that firms that introduce services that are new-to-the-market have a significantly higher degree of international customer cooperative arrangements (F=8.405, sig=0.004). Average score on customer cooperation for firms that did not introduce new-to-the-market innovations was 0.08, while the corresponding mean value for firms that did introduce new-to-the-market innovations was 0.13.
- In general, firms that innovate in cooperation with customers introduce more **new-to-the-firm** services compared to firms that are not involved in customer cooperation (chi-square=4.68, p=0.03). The strength of the relationship is relatively weak (Phi=0.14). Analysis of variance (ANOVA) shows that firms that introduce services that are new-to-the-firm have a significantly higher degree of international customer cooperative arrangements (F=5.554, sig.=0.019). Average score on customer cooperation for firms that did not introduce new-to-the-firm innovations was 0.05, while the corresponding mean value for firms that did introduce new-to-the-firm innovations was 0.11.
- There is no significant relationship between customer cooperation and introduction of new or significantly improved **processes**.

- Firms reporting that cooperation with customers is non-existent have a significantly lower new-to-the-firm innovations.

Importance of customer cooperation in innovation

In this analysis we map “innovation type” to “importance” of customer cooperation.

- Analysis of variance (ANOVA) shows that there is a significant relationship between firms that introduced services that were new-to-the-market and the rating of customer cooperation importance ($F=4.143$, $p=0.043$).
- For the other two innovation types, no significant relationships are observed.

Firm changes other than innovations

- The questionnaire also asks the firms whether they have effectuated other creative changes in the period. Five different change categories are listed. With respect to customer cooperation there is a significant ($p<0.1$) relationship between new or significantly improved firm strategy and the importance of customer cooperation ($F= 3.311$, $p=0.070$).

Effects of supplier cooperation

- In general, more firms that are involved in supplier cooperation introduce new or significantly improved **processes** than firms that are not involved in this cooperative relationship ($\text{Chi-square}=6.25$, $p=0.01$, $\text{Phi}=0.16$). No such relationship is found for product innovations (neither new-to-the-market or new-to-the-firm innovations).
- In general, firms that introduce new or significantly improved **processes** have a significantly higher rating of the importance of supplier cooperation than firms that do not innovate new processes ($F=11.539$, $p=0.001$).

Effects of other cooperative relationships

- No significant relationships are found between competitors and any of the three innovation types.
- In general, firms that buy/acquire external R&D services have significantly higher innovation of all three innovation types:
 - New-to-the-market innovations (Chi-square=139.19, p=0.00, Phi=0.31)
 - New-to-the-firm innovations (Chi-square=246.42, p=0.00, Phi=0.41)
 - Process innovations (Chi-square=138.18, p=0.00, Phi=0.31)

Effects of cooperation on difficulties in the innovation process

The questionnaire posed the following question: *Was anything of the innovation activity in the period 1999-2001 a) seriously delayed, b) planned, but not started, c) obstructed?*

- In general, the occurrences of serious delays, planned but not started, and obstructions (various reasons) of innovation activities are significantly lower for firms that are involved in cooperative arrangements for innovation compared to firms that do not engage in such cooperative arrangements. The chi-square, significance, and Phi values for the three types of difficulties are (11.86, 0.00, 0.14); (18.44, 0.00, 0.18); (6.99, 0.01, 0.11) respectively.

4.3.2 Two case studies

The purpose of these two case studies are to observe in a structured way two different service innovation processes in their natural settings in order to gain understanding of the phenomenon and to explore how the companies have organized their value networks for service innovations. One case study is devoted to a start-up company with focus on a new-to-the-market technology-driven innovation. The other case study is devoted to an incumbent within the

financial service industry with focus on innovation infrastructure and culture in the enterprise.

Mobile Communication Partners (MCP)

The Company. MCP was formally established as a company in November 2004 but product development started earlier, in 2002, by three persons working at Ericsson in Grimstad, Norway. The idea conceived was to offer mobile services to passengers on board ships at sea. This idea was presented to a local incubator, Sørlandets Teknologisenter (STS), who regularly organizes meetings with potential partners in early phases of development processes. STS provided premises for the people of MCP and took care of the formal legal and financial matters. In collaboration with STS a commercial evaluation, a business plan, was developed by the end of 2002. A satellite-based pilot installation was ready in March 2003 and installed on a Stena Line ferry in December 2003. In 2004 MCP was accredited a GSM operator and made 150 roaming agreements with domestic mobile operators in various countries. MCP has GSM licenses in Norway, Sweden and the Netherlands. The first commercial contract was made with the ferry company, DFDS, for their entire fleet of ferries in the Fall of 2004. Shortly afterwards a similar contract was made with Stena Line.

Start-up conditions. The innovation is a technology-driven service on mobile devices on board ships. The service is given the name CellATsea. The idea is based on an uncovered need in the market. The MCP personal had the technical know how to develop the service except for satellite communication which was acquired by a partnership with Telenor. Knowledge and networks of the shipping market were acquired by a partnership with the local shipping company Umland. To acquire the necessary ITU licenses, MCP had to approach the national telecommunication authorities, and for the roaming agreements the operators in various countries. In this work, MCP partnered with one of its customers, Stena Line.

Value networks. In the chart below, we have shown the members and structure of the value network. As described in the start-up conditions above, MCP had primarily three supporting partners in the early phase of the innovation process: STS, Telenor, and Umland. Ericsson as a supplier of equipment was also involved to some extent. Most of these partnerships are formal contractual relationships. In the early exploitation phase, MCP also partnered with customers to share risks and revenues in order to create a “win-win” situation. Telenor provided complementary capabilities in terms of satellite communication know-how. In the later stage, in the exploitation phase, roaming agreements are made with mobile operators in various countries. All these partnerships are governed by formal relationships.

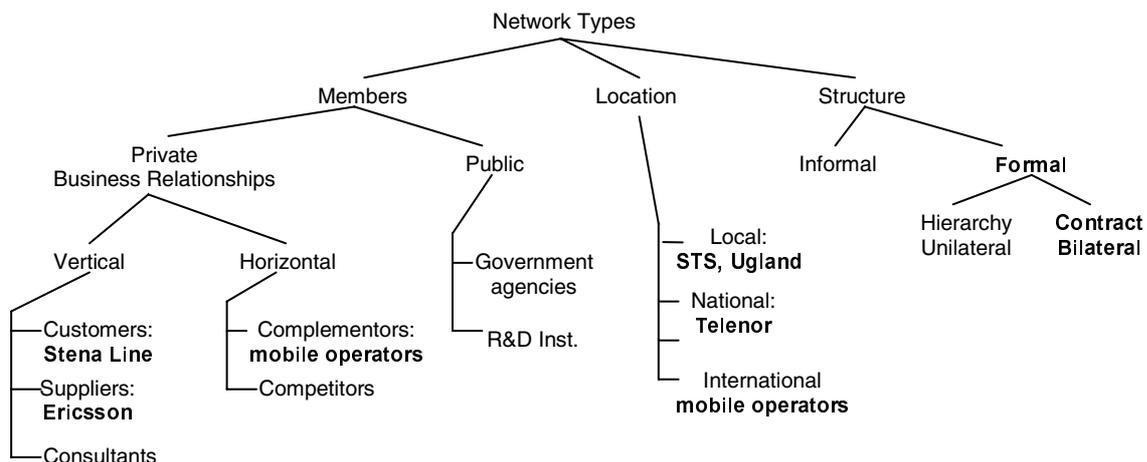


Figure 4.1 Value network of MCP

Difficulties encountered. To get the licenses as an operator and all the necessary roaming agreements with other operators in place was an extensive task and took longer time than expected.

DnB NOR

The company. DnB NOR is Norway's largest financial services group with total assets of more than NOK 1,200 billion. In 2001, DnB NOR made a study of innovative firms in Norway. As a consequence of this study they made two

moves. One was to introduce an innovation prize awarded annually to the most innovative Norwegian firm; and secondly, to establish an infrastructure and culture internally to strengthen its own innovation process. An organizational unit was established and recently they have developed premises, an innovation laboratory (iLab), for facilitation of generations, developments, and tests of innovative ideas that can increase the Group's competitive advantage. In iLab customers, competitors and complementors are invited to brainstorming meetings, and evaluation and tests of new services. The innovation activity in DnB NOR is well anchored strategically at the top level management of the Group by the chief executive being the sponsor of the activity, and also operationally by an appointed manager for the Innovation unit.

The innovations. The innovation unit is engaged in all types of innovations and uses the same procedure whether it is new-to-the-market, new-to-the-firm or a process innovation. The drivers of innovations are either demand pulled or technology pushed.

The innovation process. The innovation process is structured as a phase model. To each of the four major phases a blueprint is developed. The four phases are:

- *Scenarios.* This is the creative phase where a kind of scenario methodology is applied. Customers and other partners, for instance, retailers downstream and suppliers upstream, may be invited to these sessions. The output of this phase is scenario stories.
- *Idea testing.* Next, the opportunities and commercial values of the stories are tested. Here, IT-department will normally participate since the new services will need system support. Here, also customers are involved, mostly through focus groups.
- *Prototyping.* If the commercial evaluation is promising, a prototype is developed followed by a comprehensive requirements specification which will be the basis for development of an operating test version.

Customers are invited to evaluate the test version of the new service. A new commercial evaluation is made after this test.

- *Implementation.* The service is ready to be deployed.

Value network. The value network for innovation is shown in the chart below. As already mentioned cooperation with customers takes place in many phases of the innovation process. Another important value network member type for innovation is “distributors” in the retailing markets. Also Telenor plays a special retailing role as a distributor of mobile services controlling the interface with the end consumers through the SIM-card. Telenor is also an important complementary business partner providing technical know-how in several telecommunication areas. Tenor and DnB NOR have several partnerships in new service developments. Also innovation with competitors is performed, mostly organized by the Norwegian Financial Services Association. The innovation unit has relationships with universities NTNU and NHH) and R&D institutions (SNF and Sintef).

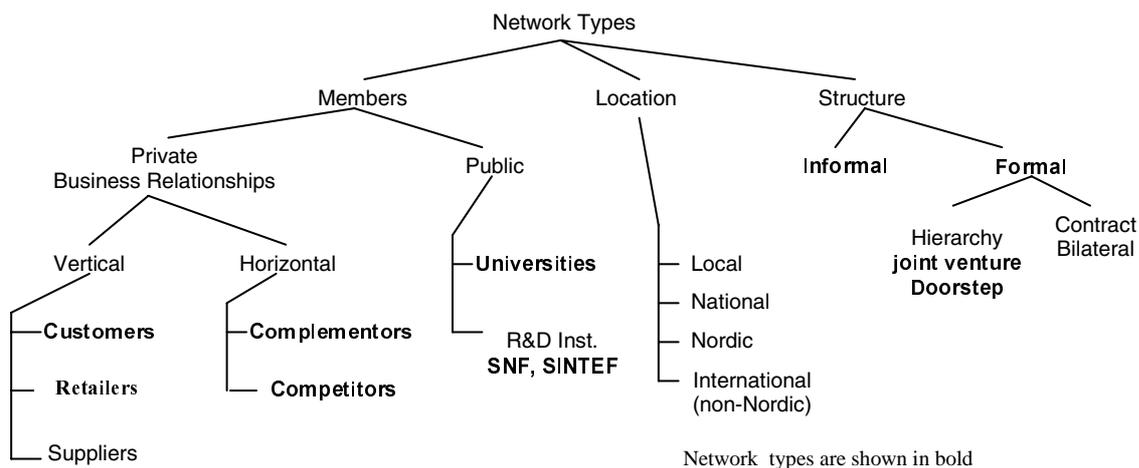


Figure 4.2 DnB NOR’s value network for innovation

Network structures.

DnB NOR's most formal cooperation relationship for innovation is a joint venture company, Doorstep, with the Norwegian telecom operator, Telenor. This venture is established to be in forefront of the technological developments in financial services. Other relationships are more ad hoc where customers are invited to innovation sessions.

Relationships for innovation in DnB NOR are all socially based. Even the joint venture, Doorstep, was originally established on the good social relationships between the two Groups' chief executive officers, although the rationale is basically strategic in order to provide complementary resources and competencies for new service developments. Also, customers invited to the innovation sessions are selected on the basis of good social relationships. DnB NOR Innovation believes in bilateral relationships more than networks in order to achieve binding collaboration.

Case studies and the theoretically developed propositions

1. With respect to a taxonomy for innovation networks, both DnB NOR and MCP have chosen formal relationships in technology driven service developments. DnB NOR's relationship with Telenor is formalized in a joint venture, and MCP's relationships with mobile operators are formalized, contractual agreements. However, the latter is more a part of the exploitation phase while the first is truly in the exploration stage. These relationships support proposition 1b. It is also worth noticing that these relationships are of a complementary nature which, however, opposes the proposition 1c. DnB NOR's relationships with customers in the exploration phase are informal and can be characterized as learning networks (proposition 2a). MCP's relationships with customers are customer order related, although some pioneering customers have been

helpful in completing the system requirements. These relationships have both a learning purpose (proposition 2a) and a strategic purpose. The partnerships with Uglund, Telenor, and others in the early phase of the developments of the company have clearly a strategic rational.

2. For DnB NOR as an incumbent, the formation process of the alliances is based on pre-existence of social relationships and supports propositions 3a and 3b. MCP, on the other hand is a start-up company with no prior value networks. Propositions 3a and b, therefore, are only valid for on-going businesses.
3. DnB NOR's choice of a joint venture for technology driven service developments is hierarchically governed and with a clear share of risks and revenues. This supports the proposition 4a. We have no information about the scope of this venture, and can, therefore, not discuss the narrowness of the scope (proposition 4b). A further exploration of this relation could be useful in order to examine various aspects of uncertainty and appropriation. Proposition 4c is clearly supported in both case studies. In particular, the customer driven innovations in DnB NOR are organized differently from the technology driven innovations. Also trust (propositions 4g and 4h) is a basic condition for the innovation networks that DnB NOR engage in.
4. We have not looked at how the specific characteristics of services impact on cooperative arrangements in these case studies. This is an aspect of service innovation that has to be further explored.

5 CONCLUSIONS AND IMPLICATIONS

In this section, results from the analysis of the CIS-3 data for understanding customer involvement and cooperative arrangements, the analyses of the primary customer involvement study and the case studies on cooperative arrangements are summarized and conclusions are made. In section 5.3, some of the implications of our main findings as well as suggestions for further research are also put forward.

5.1 Summary of findings and main conclusions

In this section, we summarize our findings and conclusions by topic. This implies findings from using the CIS-3 data for analyses of customer involvement and findings from the separate customer involvement study are reported in section 5.1.1. In section 5.1.2, a summary of the main findings from using the CIS-3 data to investigate cooperative arrangements as well as the findings from two case studies are summarized and conclusions presented.

5.1.1 Customer involvement studies

The primary objective of the studies of customer involvement was to explore the relationship between service attributes, customer involvement, innovation processes and types, and innovation results. It is often believed that customers are more important to service innovation and a theoretical and empirical examination of this assumption has been focused. First a review of some of the service innovation literature was presented. The review showed that much of the propositions on the role of customers in service innovation had been given little empirical attention. It also showed that investigations of differences across service industries in the importance of customer involvement were lacking. Still, the literature could be used to develop a set of propositions on the relationships between service attributes and customer involvement, the direct relationships between customer involvement and innovation results, and the moderating role

of service attributes on these relationships. By using the CIS-3 data, a preliminary picture could be drawn on the importance of customers (and other collaborating partners in the innovation process) to Norwegian service firms' innovation processes.

The results of the CIS-3 study may be summarized as follows:

- Institutional sources of information are less important to service firms
- Customers and suppliers were not found to be more important to service firms, contradicting what is often proposed in theoretical studies of service industries (De Jong et al., 2003)
- The same pattern was revealed when analyzing cooperative arrangements with partners instead of information sources
- When investigating differences across service industries surprisingly many significant differences were identified
- Customers seem to be a more important information source in specialized services (business services and IT)
- For some industries customers are an important information source but not an innovation partner. This was particularly the case in financial services
- Some service industries are more involved in partnerships with institutional partners. This was particularly the case for business services
- Only some of the service industries seemed to be supplier dominated. To categorize all service industries among the supplier dominated industries does not seem to be appropriate
- The pattern of information sources and cooperative arrangement partners was difficult to categorize in sub-categories of service industries
- The partners included in cooperative arrangements of service innovation seem to be rather unique to each of the service industries studied

The investigation revealed a lack of detailed measures and data on customer involvement in service industries. Consequently, a separate study of customer involvement was conducted. However, the purpose of this study reached beyond providing primary data on customer involvement. Development of measures that corresponded more thoroughly to measures used in the strategy and organization theory literature was also an important objective of this study. The study was conducted during the spring of 2005, collecting data from 109 Norwegian service providers.

The results of the customer involvement study may be summarized as follows:

- Perceptions of service attributes do not seem to correspond to theoretical pre-categorizations of service industry sub-categories found in much of the innovation and service marketing literature
- Service attributes influence all elements of customer involvement in service innovation, including participation in particular innovation process activities and innovation types
- Service attributes characterizing the interface of the service most significantly influence the elements of customer involvement in service innovation
- All theoretical propositions regarding the relationship between service attributes and customer involvement were supported
- Only 3 of 7 propositions on the direct relationships between customer involvement and innovation results are supported
- There is no general effect of customer involvement on innovation results
Particular forms of involvement, such as involvement in innovations that are new to the market and innovations in service interfaces are particularly important to customer value of innovations and process quality of innovations processes

- Service attributes do not moderate the relationship between customer involvement and innovation results. All these relationships are direct.

Even though the studies of customer involvement should be interpreted as exploratory, they revealed interesting results by confirming some of the theoretical propositions of the importance of customers to service innovation as well as identifying new relationships that has not previously been reported. An example of the latter is the finding that customers and suppliers are not more important information sources in service firms than in manufacturing firms. Instead, they are important sources to firms in both industries. Another example is the findings that involvement in innovations that are new to the market not only improves the customer value of the innovation, but also the quality of the innovation process.

The general conclusion that may be drawn is that more investigations are required of the elements of service innovation including process elements, innovation types, antecedents of innovation, as well as different innovation effects in service firms. Using data from regular innovation studies for this purpose is insufficient and the indicators used in these studies need to be better adapted to capture service innovation processes (Hipp and Grupp, 2005). Still, the findings also shows that it is possible to develop such indicators, and that cost efficient research designs may be used to develop better insight into service innovation processes. Some of the implications of these findings are summarized in section 5.2.

5.1.2 Value networks and collaborative arrangements studies

Our primary objective in this study on value networks for service innovations is to explore the effects of collaborative arrangements on innovation processes. We started our endeavor by researching the literature on alliances and collaborative

partnerships in general and developed some research propositions applicable to service innovations.

The literature on cooperative partnerships is huge but can be sorted within three different theoretical perspectives. Each perspective comprises several theories, each of which makes contributions to our understanding of cooperative partnerships in business organizations. The *strategic management* perspective uses the resource-based view of the firm to analyze internal strength, and market power theory to analyze the competitive environment. The *economic* perspective uses transaction cost analysis to develop governance structures, and increasing return theory to analyze extrinsic service values generated by network effects. The *social* perspective looks at value networks as social relationships between partners. Two theories are studied, the social exchange theory and social network theory, to analyze social positioning of the partners in the networks. Fundamental concepts in this perspective are trust, dependency and embeddedness.

From these theoretical perspectives we develop a set of propositions that highlight an important set of conditions for service innovations in value networks to work. In doing this we used a conceptual framework of the sequence of events of alliance processes as described in Gulati (1998). Adapting this sequencing to our study we structure the events into the decision to enter an alliance, the choice of partners, the choice of governance structure, conflict resolution as the process evolves, and performance or outcome.

However, we started initially by developing a taxonomy of innovation networks based on three different characteristics: business roles, location of partners, and governance structure. From these characteristics we formulate three propositions, two on the formality of the structure, and one on business roles.

With respect to why firms enter into innovation networks, the antecedents, we formulate two propositions, one associated with the primary purpose to enter the network, and one related to characteristics of the business environment. Regarding the formation process, two propositions are stated concerning social relationships. Next, governance structure in innovation networks is fairly extensively treated, giving rise to eight propositions concerning appropriation, service attributes, and trust. One proposition regarding conflict resolution is included. Finally, two propositions are formulated on performance conditions. In summary, by utilizing factors from the variety of theories relevant to cooperative partnerships we ended up with a total of eighteen propositions on value networks for service innovation.

These propositions are not empirically tested in this study. We did perform two case studies based on an interview guide developed from the set of research propositions in order to explore real innovation processes and gain understanding of how companies organize their value networks for innovations. One company was a start-up technology based service company, the other an incumbent in the financial sector. The innovation processes in the two companies are described and the propositions are tested for their relevance. We have found support for all applicable propositions except for one, proposition 1c. This proposition suggests that service firms use more vertically positioned partners than horizontally positioned partners for innovations. Both companies in our case studies use horizontally positioned partners primarily to support complementary capabilities.

From the larger empirical data base of the Norwegian CIS-3 study, we found that nearly half (44%) of the innovative service firms had done this in collaboration with partners. The two most frequently used partner types were customers (22.7%) and suppliers (28.5%). Moving from this descriptive

statistics to effects of cooperative networks on innovations, we found that these networks had a positive effect on innovation intensity for both new-to-the-market and new-to-the-firm innovations, while no effects were identified on innovation processes. The same general effects were identified when segmenting on customers as partners. Supplier cooperation, however, showed a positive effect on innovation processes intensity only. Also, the occurrences of serious delays and obstructions in the innovation processes were significantly lower for service firms innovating with partners. Our findings indicate that, in general, cooperative arrangements seem to have positive effects on innovation intensity and innovation processes.

However, the propositions need to be tested in a larger empirical setting with a variety of service sectors, service attributes, innovation types, and network types.

5.2 General implications

The findings summarized in section 5.1 have implications at the firm level both for service firms and manufacturing firms encapsulating their products with services, at the policy level for government and for innovation support system managers. Finally, the findings have implications for further research.

At the firm level, the customer involvement studies have three main implications. First, customer involvement is not a universal tactic that may be used to ensure successful innovation results and improve the customer value of service innovations in general. Second, but most important, customer involvement has some valuable effects if customers are involved in the right type of innovations. In particular, for innovations that are new to the market, customers should be deeply involved to improve innovation process quality and

customer value. Finally, the previous implication is universal to *all* service providers, regardless of the type of service offered.

For the value network studies, the interview guide was developed through a thorough literature review and has through the case studies proved its relevance to probe data on innovation process in general, and value networks in particular. With some modifications the interview guide can be used by innovating companies as an instrument to structure the important topics to deal with when entering a collaborative partnership for innovations.

The CIS-3 data analysis indicates the significance of cooperative arrangements in innovations. These data suggest that customers and suppliers are two important partner types together with institutional organizations in R&D innovations. Customers are frequent partners in service developments while suppliers are more important for new process developments.

At the policy level, the customer involvement studies have two major implications. First, service innovation is different from product innovation. However, the difference does not seem to be so great for the importance of customers or value network partnerships. Instead, it seems that the difference is greatest when it comes to the use of institutional information sources and partners. Thus, policy makers and support system officials should design programs making institutional sources more relevant partners for service firms. The second implication is that these programs and the other tools of the innovation support system can not be designed as universal service industry tools, but must be adapted to the differences identified across different service industries. Categorizations of service industries may help in designing categories of innovation support system tools.

For the value network studies, the interview guide can, as for firm level managers, be used by innovation support organizations, incubators, etc., as an instrument in guiding the establishment of value networks for innovating companies. Furthermore, the importance of cooperative arrangements indicated by the CIS-3 analysis should be further encouraged by governmental innovation policies and stimulated by research funding.

For future research, the customer involvement studies have two main implications. First, measures developed through these studies seem valuable and may be used to capture the particularities of service innovations. They also seem to represent a valuable point of departure for developing refined measures of elements of service innovation that makes integration of innovation studies, and strategy and marketing studies on service innovation possible. Second, the exploratory study of customer involvement shows that strategic studies focusing specific elements of the service innovation policy and investigating these elements in research designs contrasting sub categories of service industries is a valuable way to develop our understanding of service innovation processes, types and results. Such studies may also be scaled up to capture more elements of service innovation and more sub-categories of service industries to finally end up as important additions to regular innovation studies.

The value network study reported here is exploratory and its main purpose was defined at the start to be a collection of knowledge on cooperative arrangements and alliances in the literature and by two case studies. Later analysis on innovation cooperation has been added by using the available CIS-3 data. The research design used in this study is not very robust and needs to be further elaborated. The extensive literature review unveiled that there exists no unified conceptual framework for analyzing and explaining value networks for service innovations. However, the research propositions developed should be a good starting point, and the interview guide can easily be transformed to an

instrument for a broader survey on value networks for service innovations. This instrument, however, should also be refined to deal with variations in innovation complexity, for instance, for various service attributes, service types, and service sectors.

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APPENDIX A. CIS-3 ITEMS

Innovation/type indicators:

- Degree of innovativeness – Innovation – product or process (INPDT og INPCS)
- Degree of innovativeness – R&D Manyears (APR_FOUARS)
- Degree of innovativeness – Innovation costs (APR_INTFOU)
- Degree of innovativeness – Innovation – product in period (INPDT)
- Degree of innovativeness – Innovation – product in period (INPCS)
- Firm level innovation intensity – Newness of innovation to market (INMAR)
- Firm level innovation intensity – Revenue distribution (local/global) (TURNIN)
- Innovation type – Own R&D (RRDIN)
- Innovation type – Purchase R&D (RRDEX)
- Innovation type – Purchase equipment (RMAC)
- Innovation type – Purchase knowledge (ROEK)
- Innovation type – Knowledge development (RTR)
- Innovation type – Market introductions (RMAR)
- Innovation type – Design (RPRE)
- Innovation type – Process or product (PRODUKT, PROSESS)
- Innovation type – Type of R&D (GRU, ANV, UTV)
- Innovation type – Patents (PAAP, PAVA)
- Innovation type – Formal protection (PROREG, PROTM, PROCP)
- Innovation type – Strategic protection (PROSEC, PRODES, PROTM)
- Innovation type – Change in strategy (ACTSTR)
- Innovation type – Change in management (ACTMAN)
- Innovation type – Change in organization (ACTORG)
- Innovation type – Change in marketing strategy (ACTMAR)
- Innovation type – Change in aesthetics (ACTES)
-

Innovation process indicators:

- Type of funding – Own versus external versus government (REGMINT, RVENINT, RLANINT, RSKNINT, RSKUINT, ROLJINT, RANFINT, RAUFINT, RNFRINT, RFUNNINT, RSNDINT, RDEPINT, REUINT, RUTLINT, RFININT?)
- Information sources – Internal (SENT, SGRP)
- Information sources – Market (SSUP, SCLI, SCOM, SUNI, SLAB)
- Information sources – Institutional (SUNI, SGMT)
- Information sources – Other (SPRO, SEXB)
- Innovation process cooperation – Total (CO)

- Innovation process cooperation – Own, collaboration, other – product (INPDTW)
- Innovation process cooperation – Own, collaboration, other – process (INPCSSW)
- Innovation process cooperation – Yes/No(CO)
- Innovation process cooperation – Own corporation/enterprise (COAND)
- Innovation process cooperation – Suppliers (COLEV)
- Innovation process cooperation – Customers (COKUN)
- Innovation process cooperation – Competitors (COKON)
- Innovation process cooperation – Consultants (COSUL)
- Innovation process cooperation – R&D firms (COFOU)
- Innovation process cooperation – Universities (COUOH)
- Innovation process cooperation – R&D Institutions (COINST)
- Innovation process termination – (INAB)

Innovation condition indicators:

- Barriers to innovation – Financial (HECO, HCO, HFIN)
- Barriers to innovation – Internal (HORG, HPER, HTEC, HINF)
- Barriers to innovation – Other barriers (HFLEX, HCUS)
- Revenue per employee – technology versus labor intensive production (OMS_SYS)
- Industry level innovation intensity – Product/Service life time (LIFE)
- Main markets (local/global) (SIGMAR)
- Main markets (exports) (EXPandel)
- Government support of innovation (FUNLOC, FUNGMT, FUNRTD)

Innovation results/effects indicators:

- Product related effects (ERANGE, EMAR, EQUA)
- Process related effects (EFLEX, ECAP, ELBR, EMAT)
- Other effects (EENV, ESTD)

APPENDIX B. CUSTOMER INVOLVEMENT QUESTIONNAIRE

Side 1 av 4 

Konsentrer deg først om **den tjenesten dere tilbyr som er omtalt i e-posten du fikk**. Bruk den som utgangspunkt gjennom hele undersøkelsen.

Svar på spørsmålene ut fra dine **erfaringer**. Hvis du ikke har erfaringer vil vi likevel at du svarer på spørsmålene ut fra det du **vet eller tror om tjenesten**.

Vennligst ta stilling til følgende utsagn om tjenesten på en skala fra 1 til 5 der 1 er svært uenig og 5 er svært enig :	Svært uenig	1	2	3	4	Svært enig
Tjenesten er vanskelig å forstå for kundene	<input type="radio"/>					
Det er vanskelig å illustrere det konkrete innholdet eller hensikten med tjenesten overfor kunden	<input type="radio"/>					
Tjenesten består av få håndfaste elementer under levering (fysisk utstyr, synlig personell og lignende)	<input type="radio"/>					
Vår produksjon og kundens forbruk av tjenesten foregår samtidig	<input type="radio"/>					
Tjenestens produksjonsprosess er synlig for kunden	<input type="radio"/>					
Kunden forbruker tjenesten i samme øyeblikk som den produseres	<input type="radio"/>					
Tjenesten leveres og produseres spesielt for den enkelte kunde	<input type="radio"/>					
Kvaliteten på tjenesten kan variere fra en kunde til en annen	<input type="radio"/>					
Denne tjenesten er ikke standardisert	<input type="radio"/>					

Vennligst ta stilling til følgende utsagn om tjenesten på en skala fra 1 til 5 der 1 er svært uenig og 5 er svært enig :	Svært uenig	1	2	3	4	Svært enig
Denne tjenesten kan ikke lagres	<input type="radio"/>					
Etterspørselen etter tjenesten kan i perioder overstige kapasiteten vår	<input type="radio"/>					
Det er vanskelig å planlegge produksjonskapasiteten for tjenesten	<input type="radio"/>					
Denne tjenesten består primært av informasjon	<input type="radio"/>					
Vår virksomhet karakteriseres av høy informasjonsintensitet	<input type="radio"/>					
Viktige deler av tjenesten kan digitaliseres	<input type="radio"/>					
Store deler av tjenesten kan formidles over elektroniske nett (Internett, telenett eller lignende)	<input type="radio"/>					
Kunden får adgang til store deler av tjenesten gjennom elektroniske medier (PC, mobil, eller lignende)	<input type="radio"/>					

Klikk på "Send" når skjemaet er utfyllt og du er klar til å gå til side 2

Sidene vedlikeholdes av [Andreas Luteberget](#)

Side 2 av 4 

Konsentrer deg nå om **hvordan kundene trekkes inn** når dere utvikler nye tjenester eller forbedrer tjenesten.

Svar på spørsmålene ut fra dine **erfaringer**. Hvis du ikke har erfaringer vil vi likevel at du svarer på spørsmålene ut fra det du **vet eller tror om tjenesteutviklingsprosessen**.

Vennligst ta stilling til følgende utsagn om tjenesteutviklingsprosessen på en skala fra 1 til 5 der 1 er svært uenig og 5 er svært enig :	Svært uenig	1	2	3	4	Svært enig
Vi samarbeider med kunder i alle faser av tjenesteutviklingsprosessen	<input type="radio"/>					
Samarbeidet med kunder om tjenesteutvikling har gjerne lang varighet	<input type="radio"/>					
Samtaler og samarbeid med kunder under tjenesteutviklingen forekommer hyppig under prosessen	<input type="radio"/>					
Et stort antall kunder er gjerne involvert under tjenesteutvikling	<input type="radio"/>					
Intensiteten i kundeinvolveringen er ofte svært høy	<input type="radio"/>					

Angi på en skala fra 1 til 5 der 1 er svært lite og 5 er svært mye i hvilken grad kundene involveres i følgende faser av innovasjons- eller utviklingsprosessen	Svært lite	1	2	3	4	Svært mye
Idegeneringsfasen	<input type="radio"/>					
Utvikling av tjenestekonsept (utkast til ny tjeneste)	<input type="radio"/>					
Etablering og sammensetning av tjenesteutviklingsprosjekt	<input type="radio"/>					
Utvikling av selve tjenesten	<input type="radio"/>					
Testing av pilot eller prototypetjeneste	<input type="radio"/>					
Lansering av ferdig ny tjeneste i markedet	<input type="radio"/>					

Vennligst ta stilling til følgende utsagn om ulike typer tjenesteutvikling på en skala fra 1 til 5 der 1 er svært uenig og 5 er svært enig :	Svært uenig	1	2	3	4	Svært enig
Vi involverer i stor grad kunden i utvikling av nye tjenester eller endring i tjenester som:	<input type="radio"/>					
- gjør at kunden får større nytte eller glede av tjenesten	<input type="radio"/>					
- er helt nye for kunden	<input type="radio"/>					
- innebærer bruk av teknologi som er ny for kunden	<input type="radio"/>					
- gjør at virksomheten må forholde seg til helt nye kunder	<input type="radio"/>					
- henvender seg til kunder vi har liten erfaring med	<input type="radio"/>					
- gjør at vi må bruke ny teknologi vi har liten erfaring med	<input type="radio"/>					
- gjør at vi må bruke kunnskap vi ikke har hatt før	<input type="radio"/>					

Klikk på "Send" når skjemaet er utfyllt og du er klar til å gå til side 3

Sidene vedlikeholdes av [Andreas Luteberget](#)

Side 3 av 4



Konsentrer deg fortsatt om **hvordan kundene trekkes inn** når dere utvikler nye tjenester eller forbedrer tjenesten.

Svar på spørsmålene ut fra dine **erfaringer**. Hvis du ikke har erfaringer vil vi likevel at du svarer på spørsmålene ut fra det du **vet** eller **tror** om **tjenesteutviklingen deres**.

Vennligst ta stilling til følgende utsagn om ulike typer tjenesteutvikling på en skala fra 1 til 5 der 1 er svært uenig og 5 er svært enig :	Svært uenig	1	2	3	4	Svært enig
Vi involverer i stor grad kunden i utvikling av nye tjenester eller endring i tjenester som:						
- innebærer en endring i tjenestekonseptet vårt	<input type="radio"/>					
- innebærer et tillegg til det eksisterende tjenester allerede tilbyr	<input type="radio"/>					
- innebærer en utvidelse av det markedet vi betjener	<input type="radio"/>					
- ikke innebærer noe vesentlig nytt, men at tjenesten kan relanseres eller reposisjoneres i markedet	<input type="radio"/>					
Vi involverer i stor grad kunden i utvikling av nye tjenester eller endring i tjenester som:						
- innebærer at vi blir tilgjengelige i andre distribusjonskanaler	<input type="radio"/>					
- innebærer mer samarbeid mellom kundene	<input type="radio"/>					
- innebærer mer samarbeid mellom oss og kundene	<input type="radio"/>					
- innebærer økt selv-betjening eller at kunden på andre måter selv tar ansvar for større del av tjenesteleveransen	<input type="radio"/>					
- innebærer at andre aktører tar ansvar for delleveranser i våre tjenester	<input type="radio"/>					
Vi involverer i stor grad kunden i utvikling av nye tjenester eller endring i tjenester som:						
- innebærer økt standardisering	<input type="radio"/>					
- innebærer at våre leveranser lettere kan deles opp i enkeltleveranser eller enkelttjenester	<input type="radio"/>					
- innebærer at hele eller deler av våre tjenester kan leveres elektronisk	<input type="radio"/>					
- innebærer bruk av ny teknologi for å produsere tjenesten	<input type="radio"/>					
- innebærer en ny måte å organisere oss på	<input type="radio"/>					
- innebærer en ny måte å lede tjenestevirksomheten vår på	<input type="radio"/>					
- innebærer ny måte å organisere hele eller store deler av næringen på	<input type="radio"/>					

Klikk på "Send" når skjemaet er utfyllt og du er klar til å gå til side 4 Send Nullstill

Sidene vedlikeholdes av [Andreas Luteberg](#)

Side 4 av 4



Konsentrer deg fortsatt om **hvordan kundene trekkes inn** når dere utvikler nye tjenester eller forbedrer tjenesten.

Svar på spørsmålene ut fra dine **erfaringer**. Hvis du ikke har erfaringer vil vi likevel at du svarer på spørsmålene ut fra det du **vet** eller **tror** om **tjenesteutviklingen deres**.

Vennligst ta stilling til følgende utsagn om måten kundene involveres på en skala fra 1 til 5 der 1 er svært uenig og 5 er svært enig :	Svært uenig	1	2	3	4	Svært enig
Vi har en fast gruppe kunder vi bruker til å evaluere endringer i eller nye tjenester før de lanseres (beta-testing)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vi involverer primært de mest innovative kundene i utviklingsprosessen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vi involverer også helt vanlige kunder i utviklingsprosessen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vi involverer primært de finansielt sterke kundene i utviklingsprosessen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vi involverer primært de kundene vi har langsiktige relasjoner med i utviklingsprosessen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Konsentrer deg nå til slutt om utviklingsprosjektene deres .						
Ta stilling til følgende utsagn om hvor suksessfulle deres utviklingsprosjekter er på en skala fra 1 til 5 der 1 er svært uenig og 5 er svært enig :						
Sammenlignet med våre konkurrenter tar våre utviklingsprosjekter kortere tid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vi gjennomfører utviklingsprosjekter hyppigere enn våre konkurrenter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vi er svært tilfreds med kvaliteten på utviklingsprosjektene våre	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vi gjennomfører våre utviklingsprosjekter med lavere kostnader enn konkurrentene	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kunden oppfatter verdien av våre utviklingsprosjekter som svært stor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Våre utviklingsprosjekter øker alltid vår evne til å tilfredstille kundenes ønsker og behov	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sammenlignet med våre konkurrenter er våre utviklingsprosjekter mer lønnsomme	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Våre utviklingsprosjekter gjør at vår markedsandel øker mer enn konkurrentenes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Våre utviklingsprosjekter gjør at vi har større vekst enn våre konkurrenter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vennligst besvar følgende spørsmål:						
Omtrent hvor stor omsetning har virksomheten deres?	<input type="text"/> Kroner					
Omtrent hvor mange ansatte har virksomheten deres?	<input type="text"/> Personer					
Hvilken næring er virksomheten deres i?	<input type="text"/>					

Klikk på "Send" når skjemaet er utfyllt Send Nullstill

Sidene vedlikeholdes av [Andreas Luteberg](#)

APPENDIX C. INTERVIEW GUIDE

1. Kort om bedriften: historikk, størrelse, antall ansatte
2. Ta utgangspunkt i en bestemt innovasjon – beskriv denne.
3. Hvilken av følgende typer innovasjon er dette?
 - a. Ny eller betydelig forbedret tjeneste (nye funksjoner) på markedet
 - b. Ny eller betydelig forbedret (nye funksjoner) tjeneste for firmaet
 - c. Nytt kundegrensesnitt
 - d. Ny verdikjede nedstrøms (nytt leveringssystem) (prosess-innovasjon)
 - e. Ny verdikjede oppstrøms (forsyningskjeden) (prosess-innovasjon)
4. Er det spesielle egenskaper ved den påtenkte tjenesten som man måtte ta særlig hensyn til ved planleggingen av innovasjonsprosessen?
5. Startbetingelser
 - a. Hvilke forventninger hadde man til denne innovasjonen?
 - b. Hvordan vil du beskrive kulturen i bedriften for utviklingsarbeid av denne typen?
 - i. Ledelsens engasjement - prosjekt sponsor: passet prosjektet inn med bedriftens strategi?
 - ii. prosjekt champion, etc.
 - c. Hvilke rammebetingelser var spesielt viktig å ta hensyn til?
 - i. Markedsbetingelser
 - ii. Finansiering
 - iii. Kunnskapsnivå
 - iv. Personer til å gjennomføre prosjektet
 - v. Ressurser forøvrig
6. Innovasjonsprosessen
 - a. Hvordan vil du karakterisere gjennomføringen av prosjektet?
 - b. Idégenerering - hvem tok initiativet; hvilke kilder startet denne prosessen; ble prosessen formalisert og hadde an eventuelt en modell: aktivitetsmodell el.?
 - c. Har arbeidet underveis ført til endringer i konseptet eller partnersamarbeidet?
 - d. Hvordan ble den kommersielle vurderingen av innovasjonen gjort?
 - i. Når i prosessen ble dette gjort
 - ii. Har det fått konsekvenser for samarbeidet?
7. Verdinettverk
 - a. Har bedriften hatt samarbeid i innovasjonsprosessen med en eller flere av følgende partnertyper (etter funksjon i verdiskapningen):
 - i. Kunder
 - ii. Distributører
 - iii. Vertikale leverandører
 - iv. Komplementære leverandører
 - v. Konkurrenter
 - vi. Andre: U og H, FoU inst., konsulenter: spesifiser
 - b. Hvor er samarbeidspartnerne geografisk lokalisert:
 - i. Lokalt
 - ii. Nasjonalt
 - iii. Skandinavia
 - iv. Internasjonalt
 - c. Hva slags type nettverk/samarbeid er det?
 - i. vertikal/horisontal
 - ii. joint venture (egenkapitalbasert)

- iii. prosjekt
 - d. For STS: har man erfaring med forskjellige typer samarbeidsnettverk?
 - e. Hva har vært motivet for å inngå samarbeidet:
 - i. Læring
 - ii. Komplettere begrensede/manglende ressurser
 - 1. kunnskap
 - 2. teknologi
 - 3. kapital
 - iii. Dele på risiko
 - iv. Effektiviseringsgevinster
 - 1. kostnadsminimering
 - 2. kortere utviklingstid (Time-to-market)
 - f. Partnerinitiering - beskriv partnerskapet
 - i. Hvem tok initiativet til samarbeidet?
 - ii. Er der noen sosiale relasjoner som har betydd noe for valget?
 - iii. Har bedriften erfaring med partnerskap fra før - de samme?
 - g. Hvordan er samarbeidsforholdet organisert og styrt?
 - i. Er samarbeidet bilateralt eller nettverksorganisert?
 - ii. Hvordan er ansvarsfordelingen mellom partene - inngår det formell kontrakt mellom partene? Hvordan er grensesnittet mellom partnerne utformet?
 - iii. Hvor sterk av styring er det fra en av partnerne - hvem?
 - iv. Er samhandlingen styrt av transaksjonseffektivitet eller er læring gjennom partnersamarbeidet viktigst?
 - v. Makt mellom partnerne
 - vi. Tillit mellom partnerne
 - vii. Hvordan er verdiskapingen mellom partnerne fordelt - er man fornøyd med delingen?
 - h. Hvordan er aktivitetene fordelt
 - i. Modularisering av prosjektet?
 - ii. Sekvensiell avhengighet mellom partnerne
 - iii. Mye frem og tilbake
 - iv. Aktivitetene hos partnerne er samlet i et felles prosjekt
 - i. Håndtering av potensielle vanskeligheter/konflikter
 - i. Har man møtt vanskeligheter i samarbeidet underveis?
 - 1. Kostnadsoverskridelser
 - 2. Forsinkelser
 - 3. Partnerne har ikke tilført prosjektet tilstrekkelige ressurser
 - ii. Hvis ja, hvordan har man løst dem?
 - 1. Reforhandlinger mellom partene
 - 2. Tilpasninger innad i prosjektet
 - iii. Forholdet mellom fleksibilitet i innovasjonsprosessen og fasthet i samarbeidet
8. Hvordan vil du karakterisere prosessens utfall?
- a. Har man oppnådd planleggingsmålene - tid, kostnad, kvalitet?
 - b. Klarte man å komme inn i kommersialiseringsfasen på planlagt tid?
 - c. Er der andre resultater av innovasjonsprosessen som er nyttige?
 - d. Er innovasjonsprosessen vellykket gjennomført - har man lært noe, hvis ja, på hvilke punkter (prosesser, ferdigheter, etc.)?
 - e. Er det erfaringer fra samarbeidet som man kan lære av?

