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Competitive Advantage in Networks of Knowledge-Intensive Business Services

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Onni

I

Kiitos elämästä, Äiti.

Pari riviä tein kirjaimia tänään.

Siinä kaikki. Olen onnellinen.

II

Suvimaisema: lahdentyven,

saunaranta ja vene

ja helle, männiköntuoksu,

kukat, välkkyvät kalat,

lapsi, lapsia, lapset

ja vanha onnellinen kaiku:

Isä, hei!

- Lauri Viita -

ABSTRACT

VUORI, Elisa. 2012. *"Competitive Advantage in Networks of Knowledge-Intensive Business Services"*. Department of Business Information Management and Logistics, Tampere University of Technology, Tampere, Finland.

Keywords: Business network, network strategy, knowledge-intensive business service, competitive advantage

This dissertation intends to increase the understanding of knowledge-intensive services, which are a sector of growing significance, and business networks, which is a form of organizing that is growing as companies outsource their operations. In this dissertation, the research problem is to find how the characteristics of knowledge-intensive business services affect to the competitive advantage gained in a business network. The research problem is solved by conceptual analysis and an empirical study consisting of three case studies based on interviews.

In conceptual analysis the sources of competitive advantage were first sought. They were then reflected to the business network framework. Potential sources of competitive advantage were sought in the transaction cost theory, resource-based view, knowledge-based view and social capital view literature streams. In the study, six sources of competitive advantage that can be gained in a network were identified. The literature on knowledge-intensive business services was then reviewed in order to determine the characteristics of knowledge-intensive business services that affect the potential to gain each source of competitive advantage in a business network. The origins of the characteristics were traced to spring from two dimensions: the level of standardization of service transactions and the degree of tacitness of the knowledge transferred in those transactions. With those dimensions a two dimensional matrix was formed, consisting of four possible types of networks with assumptions about the potential competitive advantage of each type of network. Case studies were classified within this matrix, and the intention of the empirical study was to increase the understanding on the interdependences between knowledge-intensive service transaction dimensions and the competitive advantages gained.

Assumed interdependencies were mostly found in the case studies, but empirical studies also brought some new interdependencies, like the one between tacitness and standardization. Attempts to increase standardization are taken to make the service business more like manufacturing. Service standardization in a KIBS situation would also mean objectivation of knowledge in order to build standard interfaces and processes. In networks with a low degree of standardization the companies should adapt to each other and create relation-specific investments, facilitate the flow of knowledge and provide social credentials. In networks with high standardization, companies should specialize, use networks to search for and access new knowledge and resources and objectivate knowledge. Purchasing knowledge-intensive business services with high level of tacitness in transaction requires overlapping competences, adaptations and trust, and thus accessing new knowledgeor knowledge and resources outside of closure, is difficult. In networks, where transactions have a high degree of tacitness, companies need to adapt to each other, create relation-specific investments and thus increase performance. They also need to facilitate the flow of knowledge to create trust, and provide social credentials. Companies cannot specialize to the extent that they avoid all overlap, and accessing really new knowledge is also difficult. Companies can however facilitate the flow of knowledge, and by objectivating knowledge, they can decrease the level of tacitness.

TIIVISTELMÄ

VUORI, Elisa. 2012. *"Competitive Advantage in Networks of Knowledge-Intensive Business Services"*. Tiedonhallinnan ja logistiikan laitos, Tampereen teknillinen yliopisto.

Asiasanat: Liiketoimintaverkosto, verkostostrategia, tietointensiivinen liike-elämän palvelu, kilpailuetu

Palvelut, ja erityisesti tietointensiiviset liike-elämän palvelut, ovat kasvavassa roolissa yhteiskunnassamme. Liike-elämän palveluiden kasvu aiheuttaa sen, että yhä useampi yritys toimii useissa erilaisissa verkostoissa, koska ne muodostavat liiketoimintasuhteita ulkoistaessaan palveluitaan. Tämän väitöskirjan tavoitteena on lisätä ymmärrystä siitä, millaisia kilpailuedun lähteitä verkostoista voidaan saada, ja miten tietointensiivisten liike-elämän palveluiden ominaisuudet vaikuttavat tähän kilpailuedun lähteiden saatavuuteen. Tutkimusongelmaan vastataan käsiteanalyysin ja kolmen tapaustutkimuksen kautta, joissa aineisto on kerätty haastattelemalla.

Käsiteanalyysissa selvitettiin ensin potentiaalisia kilpailuedun lähteitä. Kilpailuedun lähteet sovitettiin sitten liiketoimintaverkostojen viitekehykseeen. Kilpailuedun lähteitä selittävinä teorioina käytettiin transaktiokustannusteoriaa, resurssipohjaista näkökulmaa, tietopohjaista näkökulmaa ja sosiaalisen pääoman näkökulmaa. Kuusi tapaa saada verkostosta kilpailuetua tunnistettiin. Seuraavaksi kirjallisuuden perusteella määriteltiin, mitkä ominaisuudet ovat tyypillisiä tietointensiivisille liike-elämän palveluille, ja mitkä näistä ominaisuuksista vaikuttavat siihen, mitä kilpailuedun lähteitä niiden verkostoista voidaan saada. Tuloksena löydettiin kaksi vaikuttavaa dimensiota: tiedon hiljaisuuden aste ja palvelun standardoinnin aste. Näiden dimensioiden pohjalta muodostettiin nelikenttä, jossa esitellään neljä eri tyyppistä verkostoa, ja teoriasta nostetut oletukset siitä, mitä kilpailuedun lähteitä verkostosta voidaan saada. Tapaustutkimukset luokiteltiin nelikentän perusteella ja tapaustutkimusten avulla kasvatetaan ymmärrystä siitä, miten dimensiot vaikuttavat verkostosta saatavaan kilpailuetuun.

Tapaustutkimuksessa suurin osa löydöksistä oli sen mukaisia mitä teoreettisen viitekehtyksen perusteella oletettiin. Empiirinen tutkimus nosti kuitenkin esiin myös uusia riippuvuussuhteita, kuten tiedon hiljaisuuden ja standardoinnin välillä. Standardoinnin astetta pyritään kasvattamaan, jotta palvelun transaktio muistuttaisi enemmän tuotteen transaktiota. Tietointensiivisten liike-elämän palveluiden standardointi vaatii kuitenkin useissa tilanteissa tiedon hiljaisuuden vähentämistä, jotta rajapinnat tai prosessit voidaan standardoida. Verkostoissa, joissa on alhainen standardoinnin aste, yritysten kannattaa sopeutua toisiinsa, panostaa suhteisiin, helpottaa tiedonkulkua ja käyttää suosituksia. Korkea standardointi mahdollistaa erikoistumisen ja verkoston käyttämisen uuden tiedon ja resurssien löytämiseen. Tietointensiivisten liike-elämän palveluiden ostaminen silloin kun transaktiossa siirretään tai luodaan hiljaista tietoa vaatii päällekkäistä osaamista, prosessien sopeuttamista ja luottamusta, ja tällaiset suhteet ovat tavallisesti redundantteja siinä mielessä, että ne eivät ole rakenteellisten aukkojen yli. Rakenteellisia aukkoja taas pidetään tärkeinä uuden tiedon saamisen kannalta, joten tiedon hiljaisuus hankaloittaa aidosti uuden tiedon tavoittamista. Tiedon hiljaisuus aihetuttaa sen, että yritykset eivät voi erikoistua siten, että niiden osaamisessa ei olisi päällekkäisyyttä. Yritykset voivat kuitenkin edistää tiedon kulkua verkostossa luodakseen luottamusta ja siten nostaen koko verkoston suorituskykyä. Myös tiedon hiljaisuuden asteen vähentämisessä on suuri potentiaali verkoston suorituskyvyn parantamisen kannalta.

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In Helsinki, March 14th, 2012

Elisa Vuori

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

> "A key question in strategy research is why firms differ in their conduct and profitability. In answering this question, researchers have typically chosen to view firms as autonomous entities, striving for competitive advantage from either external industry sources or from internal sources or capabilities. However, the image of atomistic actors competing for profits against each other in an impersonal marketplace is increasingly inadequate in a world in which firms are embedded in networks of social, professional, and exchange relationships with other organizational actors." (Gulati et al. 2000)

This study seeks to increase understanding of topics that are characteristic of business in all developed countries: Knowledge-intensity and services. More specifically this study concentrates on networks where knowledge-intensive business services play a central role. The current rise in the significance of collaborative networks is interlinked with the rise of services, and this study was inspired by questions about the benefit companies draw from knowledge-intensive business service networks, the factors that affect to the competitive advantage that can be gained in networks of knowledge-intensive business services, and the type of competitive advantage knowledge-intensive business service providers pursue. In this chapter the significance of these questions is explained, previous research is reviewed, a specific research gap is recognized and research problem is formulated.

1.1 Starting point

Contemporary society is a service society. It can also be said to be based on information, knowledge and intangible assets. (Hipp & Grupp 2005). An important building block in such a society is the development of an ICT sector. The internet and electronic commerce are breaking the conventional communication networks, and allowing companies to partner in ways that were not possible a decade ago (OECD 2009). New forms of partnering promote diffusion of knowledge and international competitiveness of firms (OECD 2009). Services form a larger share of the GDP of nations than do manufactured products. Outsourcing is a key factor in this development. With companies focusing on core competencies, more service-related functions are being sourced from specialised firms; this trend is serving to improve performance in key areas. (OECD 2009) Companies have outsourced their non-core operations, like accounting, maintenance, and IT-helpdesk, to service providers. Former industrial manufacturers have also begun to

supply services in order to increase their competitiveness and secure growth (Jacob & Ulaga 2008, Matthyssens & Vandenbempt 2008).

Heterogeneity, knowledge and localness are preferred above homogeneity, tangible capital and globalness, and this has also lead to the rise of networks instead of large corporations (Elfring & de Man 1998). Modern companies are interdependent in several ways: in sales, supplies, information, technology development, and access (Ford et al. 2002). That dependency has caused managers to look beyond their own company in terms of resources and business development but also the respective business networks they are in. Network organization as a concept has increased its importance, and it is popular in both the company context and in academic research (see e.g. Håkansson & Snehota 1995, Dyer 1997, Gulati 1998). There are three contours that form the main theses of the post-Chandlerian era of business management: First, firms have to focus on their core competences and outsource peripheral activities, second, companies have to design how to access external resources, and third, large firms have to keep an important role as network hubs, systems integrators and sources of architectural innovations (Gadde & Araujo 2006).

Network organization can be seen as the most recent part in the continuum of organizational forms, the previous forms being functional organization, divisionalized organization, and matrix organization (Miles & Snow 1992). Organizational forms have gradually improved organizational performance, and thus they have gained ground over their predecessors. Concentrating on core competencies has lead not only to division of firms, but also to the formation of new business networks (Sydow & Windeler 1998). A network organization differs from earlier organizational forms because 1) it utilizes collective assets and does not hold in-house all the necessary resources to produce a certain product or service 2) it relies more on markets than on hierarchies to manage resource flows 3) it expects the members of a network to voluntarily contribute to the improvement of the end product or service instead of fulfilling only contractual deeds 4) it is conceptualized part of an organizational collective based on cooperation and mutual shareholding instead of an individual company (Miles & Snow 1992).

There are three paradoxes the network organization models for strategy-making. The network paradoxes are (1) choices within existing relationships, which are enablers of current operations and restrict transformation, (2) choices about position, where one can say that company defines its relationships, but also the relationships define a company, and (3) choices about how to network, where a company must balance its will of control (Ford et al. 2002). A company's array of choices is dependent on the actions of other companies (Ford et al. 2002), and a company shares its fate with its respective network (Iansiti & Levien 2004). Therefore no company should base their strategies solely on their own resources (Ford et al. 2002) but the strategies of a networked organization need to be one level up, at the network level instead of the organization level. This study helps to cope with network paradoxes as it helps strategizing with an understanding on the limitations that existing relationships bring in, and the also choices about the position.

New organizational forms can be considered to arise from strategic goals (Johnston et al. 2006). However, not all relationships are beneficial and may end up forming intangible

liabilities. To avoid negative effects, such as a loss of efficiency, there should be consideration of how close collaborative relationships with different partners should be. Different relationship types and power hierarchies affect the manageability of relationships and networks. (Johnston et al. 2006) Hence instead of talking about networks in general it would be useful to find working strategies for different types of relationships and network situations.

Networked business has been analysed with many concepts like value networks and supply chains. The problems with managerial advice based on those concepts is that if they concentrate too much on long-term relationships, there is a danger of an uneven distribution of costs and benefits and a fragmentation of the overall management of the chain (Pfohl and Buse 2000). The use of the term chain is misleading in that it implies that companies are nodes in a chain. It is more appropriate to consider companies as parts of complex network structures. Complexity arises from the potential for horizontal relationships in addition to vertical ones, lateral relationships, circular relationships and reciprocal dependencies. (Pfohl & Buse 2000) It has been claimed that this complexity is a reason why it is impossible for any single organization to manage a network (Håkansson & Johanson 1992). However management can be understood as an act reaching beyond borders to shape cooperation, and thus a company can successfully reshape a network by applying a certain network strategy (Knight & Harland 2005). Thus the question to be answered is how management should be adapted to fit interorganizational networks (Knight & Harland 2005).

Despite the current success of network organization, the effectiveness of that form can decline due to managerial mistakes that derive from the lack of understanding of network organization (Miles & Snow 1992). Lavie (2006) suggests that firms should organize also their configuration of alliance network activities in so that they can exploit their competitive advantage. However, most companies still base their strategies on the models that were developed for the previous organizational forms. A reason for this may be that there has been little study on strategizing in a networked organization even though there has been a significant amount of literature on networks as such. Strategy literature also has not has paid much attention to networks (Baraldi et al. 2007). Companies are so dependent on partners, that strategizing without considering network aspects makes little sense (Baraldi et al. 2007).

An emerging view is that a network aspect of strategy is important (Baraldi et al. 2007). For the resource-based view there has been a suggestion that since alliance partners may shape the resource-based competitive advantage of a firm, shared resources should be taken into account (Lavie 2006). Dyer and Hatch (2006) proved that networks are "a critical unit of analysis for explaining firm performance" and companies enjoyed different advantages even in networks that appeared to be similar and the potential for differentiated networks is greater. A networked company is not relying only on its internal resources, but the resources gained through the network also are sources of competitive advantage (Kandampully 2002, Mowery et al. 1996, McEvily & Zaheer 1999, Kogut 2000, Zaheer & Bell 2005). However the sources of competitive advantage gained in network are understudied (McEvily & Marcus 2005). Strategy literature and network literature arose from different systems of thought, and thus the units of analysis have been

different: Strategy literature has been concentrating on firms, and network literature has looked at interaction, relationships and the network itself (Baraldi et al. 2007). Claims have been made that there is a theoretical gap between the traditional theories of firm and the experience gained from networked firms (Lavie 2006).

1.1.1 Advantage gained from business networks

Dyer (1996) considers specialized supplier network to be a potential source of competitive advantage. According to Dyer, such a network has to be tightly integrated and highly specialized (Dyer 1996). Möller, Rajala and Svahn (2005), find that the expected benefits of networked business models are cost efficiency, high quality, shorter lead times, new products or technologies, access to new markets, competitive power, business process re-engineering, new business areas, and access to information. Håkansson and Snehota (1995) add better adaptation to environmental changes, access to new know-how, goodwill, risk sharing, and greater innovation potential. Furthermore, networking helps to manage capacity and workload and creates better growth potential (Kulmala & Uusi-Rauva 2005). For an employee, the benefits are; job enlargement, job enrichment, job rotation, and an understanding of network operations (Kulmala & Uusi-Rauva 2005). Bae and Gargiulo find that organizations enter into alliances in order to gain access to critical resources that are not easy to available in imperfect factor markets, or access to markets with high entry barriers (Bae & Gargiulo 2004). Vainio lists the following motives to partner: technology complementarities, faster innovation processes, market access and influence on market structure, and in high-tech industries higher market penetration, a division of technology development costs, the management of uncertainty in emerging technologies, convergence of industry segments, and combating the mainstream (Vainio 2005). Gimeno (2004) still adds access to the capabilities and information from indirect and direct partners. According to Ebers and Jarillo (1998 in Kulmala & Uusi-Rauva 2005), the competitive advantage of a network comes from five sources: mutual learning, strategy of co-specialization, better information and resource flows, economies of scale, and organizing the market structure with network members. A summary of the benefits a company may gain through partnering and networking are presented in figure 1.

Figure 1. Benefits of networking found in literature.

Current action	Future possibilities
Quality of products Better processes Shorter lead time in production Capacity and workload management Higher market penetration Better resource flows Economies of scale Economic benefit Access to knowledge Access to competence Access to markets Competitive power Goodwill Job enrichment Job rotation Better understanding on network Convergence of industry segments Combating the mainstream Mutual learning Co-specialization	Shorter lead time in R&D New products New technologies Better information flows Division of development cost Risk sharing Management of uncertainty in emerging technologies Better adaptation potential Greater innovation potential Greater growth potential Influence on market structure

A networked model of business brings in new requirements for companies. Managerial challenges are numerous. Håkansson and Snehota name a few of them: complex and thus slower decision making, and differences in organizational cultures and in strategic intents (Håkansson & Snehota 1995).

Networking means sharing risks and taking on risks at the same time. Risks are shared, because companies do not need to invest in all the needed resources themselves (Möller et al. 2005). They take a risk at the same time, because they become more dependent on the competence of other companies. As Möller et al (2005) put it, if a member has competence and value creation, which are necessary, rare, and difficult to copy, the network is, to a large extent, dependent on that member and that creates risk for other members. Because niche companies specialize, they are dependent on the capabilities of a keystone (Iansiti & Levien 2004). Cooperation may also lead to a loss of competence, because some other company may substitute some of the activities carried out in the company (Håkansson & Snehota 1995). Risks are also a chance for opportunism, misconceptions, and smaller control. The main disadvantages that arise as a result of networking are presented in figure 2. A business network that has a strong core company may have problems because other companies may be passive in the development of the network, organizations in the network may not have clear and common interests, or intelligence and innovation power of the network are not any greater than that of the core company (Möller et al. 2005).

Figure 2. Problems of networking found in literature.

Current action	Future challenges
Complex and slow decision making Differences in organizational cultures Differences in strategic intents Sharing of benefit Loss of competence Misconceptions Smaller control Lack of common interest	Dependence on competence of others Risk of opportunism Risk of leakage

Several benefits and challenges that arise from networking have been recognized in empirical studies. In this study the intention is to study the benefits and challenges from the perspective of theories explaining competitive advantage in a network context, and thus map these issues on to the network strategy context.

1.1.2 Shift of competition

In most industries, a central characteristic of competition is that firms are mutually dependent: firms feel the effects of each other's moves and are prone to react to them. In this situation, which economists call an oligopoly, the outcome of a competitive move by one firm depends to at least to some extent on the reactions of its rivals. In an oligopoly a firm can choose to pursue the interests of the industry as whole, and thereby not incite competitive reaction, or it can behave for its own narrow self-interest. The dilemma arises because choosing strategies or responses that avoid the risk of warfare and make the industry as a whole better off (strategies that can be called cooperative) may mean that the firm gives up potential profits and market share. (Porter 2004)

Companies may gain a competitive advantage from networks. As an answer to the competitive advantage a firm has attained, its competitors may try to obtain the same network benefit from the same partners or from different, corresponding partners. The former act leads to intranetwork competition and the latter to internetwork competition (Gimeno 2004). The degree of specialization is inversely proportional to the competition inside a network, and proportional to the internetwork competition (Gimeno 2004). Internetwork competition may lead to a strategic gridlock that is realized as structural inertia and persistent network structures, because a firm cannot form links to companies that are partnering with a competitor (Gimeno 2004). However nowadays even direct competitors form cooperatives and thus build-up a co-opetitive relationship (Gulati & Kletter 2005).

The competitive elements in a network are not limited to companies that compete for the same customers. Alliances are considered to be cooperative agreements but that does not remove all tensions. Every firm has an incentive to maximize their own benefit with minimum input to all partnerships they are contributing (Bae & Gargiulo 2004). Thus power use even in a voluntary relationship may cause one party to gain more benefits than

another, and thus they compete on value sharing. Lavie (2006) suggests that firms with similar resources compete on network positions and try to lock competitors out of the network.

Thus strategies can be competitive or cooperative, and traditionally cooperative strategies are seen as ones which require forfeiting either profit or market share. Collaboration may lead to a shift in competition outside networks, if companies specialize and adapt. Competitors may also build up similar partner networks to gain the same network benefits. Within the network the companies may still compete on value sharing. A networked model of business may cause shifts in competition. A possible outcome is that competition takes place to a growing extent between networks rather than between individual firms.

1.1.3 Significance of services

Services form about 70 % of GDP in OECD countries and thus they play a more significant role than manufacturing. Manufacturing and services are increasingly interrelated and they develop in a co-evolutionary manner. (OECD 2009) In 2007 services represented 22.8 % of the total export and 19.4 % of the total import of OECD countries. Comparing these numbers to the GDP shares of services says one thing about the nature of services: Many services are dependent on the physical proximity and are inseparable from production. Thus they are difficult to trade internationally. However in OECD countries exports of services have grown slightly more that the export of goods, services growing 15 % and goods 14.1 % between 2002 and 2007. Globally, services grew 15.6 % and goods 16.8 % during the same period. (OECD 2009)

An especially interesting group of service providers are knowledge-intensive business services, KIBS, as they are the fastest growing sector in services (Miles 1999). That is partly due to the trend of outsourcing knowledge-intensive service activities that have been done in-house. The outsourcing of KIBS has been facilitated by information and communication technologies. (Bengtsson & Dabhilkar 2008) Knowledge-intensive organizations are a reflection of a knowledge society, and their contribution to innovation systems is significant (Miles 1998). Knowledge-intensive business services deserve special attention, not only as sources of innovation and agents of knowledge transfer, but also as a dynamic and rapidly growing sector (Miles, 2003). During the last fifteen years there has been an increasing amount of KIBS research (see e.g. Lovendahl 1997, Miles 1995, 1996, 2001, 2002).

Knowledge-intensive business services have been researched in the network context as transferors of knowledge and sources of new knowledge (Hipp & Grupp 2005). However, as the number of services increases and the service field becomes even more segmented due to the development of various technology-based KIBS, there is need to study KIBS networks from the point of view of strategy and network relationships. E.g. ICT sector uses partnering and networks increasingly to survive in a competitive and volatile market, which is characterized by high levels of uncertainty, and services operating in those networks bring up an interesting object of study (Varis et al. 2004). Developments in the

ICT sector are also a factor effecting service delivery. Services are experiencing a transformation as technological advances in ICT narrow the differences in services and manufacturing. ICT allows the use of some services without being physically present or synchronized. (OECD 2009) This combined with the standardization of services cause services to lose part of the special characteristics that separate them from products. Studying services in ICT networks may also provide insight into such developments.

1.2 Earlier research

An increased use of network organization creates a shift in competition between networks. Thus networks should be taken into account when considering competitive advantage. Sources of competitive advantage are found not only inside a company, but also in networks. Competitive advantage has traditionally been explained as arising from a firm's position or internal resources (Ryall & Sorenson 2007); less interest has been paid to resources that exist outside the company, or on how a company utilizes its network position to gain a competitive advantage. There is need for models that focus on the competitive advantage gained in a collaborative network, and in this study, the aim is to contribute to that gap. Since services have risen in their importance and their rise is linked with the formation of collaborative networks, the perspective taken in this study is of knowledge-intensive business services, and how the special characteristics of KIBS transactions affect to the competitive advantage gained in a network. In this chapter it is reviewed what areas have been studied in these topics. In this section, I review the existing literature to explain the competitive advantage of networks of knowledge-intensive services. First I look at the competitive advantage of network literature and then KIBS literature in that context.

The network approach can be traced to organizational research of the 1930s (Jack 2010). Originating in the 1940s, transaction cost theory (TCT) is one of the oldest theories explaining inter-firm relationships. In institutional economics, TCT recognized that firms do not act in a perfect market, but there are costs to each transaction. Transaction cost economics provide a theory of a firm, and partly explain the firm's behaviour in the formation of business relationships and thus networks. According to Argyres and Liebeskind (1999), TCT is becoming a predominant theory of the firm in economics. In TCT firms are considered to be a form of organization for administrating exchanges between different parties (Coase 1937).

Business relationships as a research area came into existence at the beginning of the 1980's (Håkansson and Snehota 1995). Supply chain management as a discipline appeared in the literature in the mid-1980s, even though its principles can be traced to the 1960s (Walters & Rainbird 2004). In the 1990's the interest in business relationships increased (Håkansson & Snehota 1995). At the beginning of the 1990's networked business was discussed from the point of view of marketing in the business market (Webster 1992, Achrol 1991). Other topics that gained ground during the decade were the risk of collaboration (Singh & Mitchell 1996), network formation and the structure of networks. They were partly intertwined with general network theories in other social sciences (Nohria & Cargia-Pont 1991, Miles & Snow 1992, Håkansson & Snehota 1995,

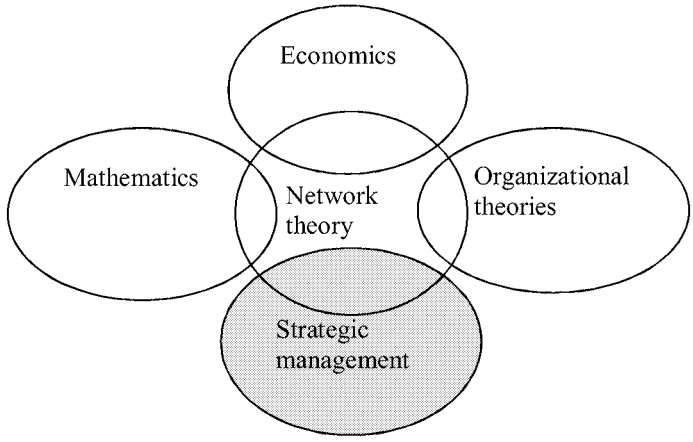
Blankenburg Holm et al. 1996, Walker et al. 1997, Madhavan et al. 1998, Gulati 1998), supply/demand or value chain management (Cox 1999), and the coevolution of strategic alliances (Doz 1996, Blankenburg Holm et al. 1996, Koza & Lewin 1999, Gulati 1999).

Studies concerning business relationships, strategic alliances, supply/demand/value chain management, value networks and business networks all contain similar elements. Value chain as a concept originates from Porter (1980, 1985). Some authors discuss value chains, others supply/demand chains. In principle, a value chain should extend down to the end customer, whereas a supply/demand chain may reach only a part of those organizations. On the other hand, the concept of "value chain" includes a reference that all organizations involved increase the value that the end customer is experiencing. Chains seem to sometimes be networks (Cox 2004), which shows that the chain concept has been elaborated over time. In modern descriptions a value chain is defined in a similar way to a business network or a business system (Walters & Lancaster 2000, Peppard & Rylander 2006).

Most theories analyzing business networks concentrate on the emergence of this organization form rather than its functioning, processes and practices (Sydow & Windeler 1998). Other problems are an emphasis on action over the structure (TCT), or on analyzing structure while neglecting the strategies and agent behaviors (Sydow & Windeler 1998). Möller et al. (2003) have a similar claim that most research has concentrated on network structure and some to development process, but the intentionality of network building and management perspectives have been in lesser role. Some scholars (Zaheer & Bell 2005, Rowley & Baum 2008, McEvily & Marcus 2005) have recently addressed this question.

A significant problem in network research is that there is a lack of a core network theory (Jack 2010). Network research consists of several theoretical bases, and network literature has developed separate from traditional theories of firm, and thus the question of competitive advantage in networked environments is still open (Lavie 2006). Existing network literature has mainly arisen from three theoretical bases: economics, organizational theories and mathematical, graph-based network theories (Sydow & Windeler 1998). The view that has been underrepresented is strategic management (figure 3).

Figure 3. Origins of current network literature.



The context chosen for this research is knowledge-intensive business services, as they are significant network members and their special characteristics may not have been taken into account in all models of network strategy. KIBS networks are those where transactions are knowledge-intensive business services. Characteristics of technologies used in the industry, social norms and institutional factors effect on the network formation and structure (Kogut 2000). KIBS companies have special characteristics that affect to their business relationships, like trustfulness, long-term relationships, co-creation and high information asymmetries. Thus KIBS networks have special characteristics in terms of what competitive advantage a focal company can gain from them, the competitive advantage gained may be context-dependent, and characteristics of transactions may be one part that affect to what kind of competitive advantage can be gained. The relationships between companies in a KIBS network tend to be long-term and strong relationships, and networks of relationships are likely to be in an important role for them. For those reasons there is a good opportunity to study the competitive advantage gained from KIBS networks.

Knowledge-intensive companies have been studied as a separate area of interest since the mid 1990's. Miles (1995) had a significant role in bringing attention to KIBS. Miles researched KIBS and KIS (knowledge-intensive service) companies from the point of view of innovation systems and innovation in KIBS. Before that KIBS companies had been studied under different names, like professional service firms (PSF) (Goodale et al. 2008).

Knowledge-intensive business services have been studied widely from the point of view of innovation. A search in ISI Web of Science with the terms "KIBS" and "innovation" returns 53 results, and a search using just the term KIBS returns 72 finds. KIBS are often studied as part of innovation systems and networks (see e.g. Miles 1998, 2003). Another common perspective is knowledge management (19 out of 72). "KIBS" and "competitive advantage" has 4 hits and "KIBS" and "network" has 7 hits. In table 1 there is a collection of studies found that discuss KIBS in the context of competitive advantage.

Table 1. Research on competitive advantage of services.

Authors	Year	Type	Findings	Industry	Theoretical basis
Bharadwaj et al.	1993	Empirical study	Cost leadership and differentation as strategic choices	Services	RBV
Kandampully	1998	Conceptual study	Service loyalty leads to customer loyalty	Services	Quality management
Elfring & de Man	1998		Rise of heterogeneity, knowledge, localness and networks	Knowledge-intensive firms	RBV, KBV
Lindahl & Beyers	1999	Empirical study	Porter's general framework does not suit services well	Producer service business	Porter
Glückler & Armbrüster	2003	Empirical study	Transactional uncertainty in business services	P-KIBS	TCT, institutional theory
Chryssochoidis & Theoharakis	2004		Price competitiveness and trust are not important for the competitiveness of a dyad	Product & Service producers & buyers	Relationship literature
Larsen et al.	2007	Empirical study	Service innovation as a main strategic area	Services	Strategic planning, design
Evanschitzky et al	2007	Conceptual study	Knowledge is a key resource leading to competitive advantage, especially in services	Knowledge-intensive services	KBV, RBV, knowledge management
Westerlund et al.	2007	Empirical study	There are four basic modes of management in networks: influencing other actors, controlling and monitoring other actors, coordinating the network structure and processes, and integrating activities and knowledge.	Software industry	Strategic network, business models
Gebauer	2007	Empirical study	The service-environment fit is crucial	Industrial services	Strategy, configuration school
Walsh et al.	2008		Intellectual capital as a source of competitive advantage	Customer services	Intellectual capital, Porter
Theoharakis et al.	2009	Empirical study	Relational resources effect on competitive advantage	Business services	RBV, IMP
Laaksonen et al.	2009	Empirical study	Decreased cost with increased trust	Business services	Game theory

In the studies presented in table 1 the effect of high transaction costs and overcoming them (e.g. by building trust) is present in several studies (Kandampully 1998, Glückler & Armbrüster 2003, Chryssochoidis & Theoharakis 2004, Laaksonen et al. 2009). This is likely to be because the characteristics of KIBS transactions are the ones that promote transaction costs or are an answer to high transaction costs. The competitive advantage in the KIBS context has commonly been discussed from the knowledge-based view and the resource-based view. Knowledge is seen as a key resource creating competitive advantage. The creation of new knowledge and innovation are also discussed. Price competition has been seen as of little account, and competition is more trust and competence based. Strategies in KIBS companies are about differentiation and not about low costs. Gebauer (2007) claims that competitive advantage may be different in service industries than it is in product industries.

In strategic sourcing research (Table 2) there have also been studies on KIBS sourcing strategies (Murray & Kotabe 1999, Murray et al. 2009). Supply management and sourcing strategy literature has focused on the sourcing of goods (Wynstra et al 2006, van der Valk 2009), even though the difference between sourcing services and goods was already noted by Wittreich (1966). Different companies may gain different advantages from their service supply networks even though they seemed to be similarly organized (Murray et al. 2009). The sourcing strategy has to be aligned with attributes of sourced service (Murray et al. 2009). Services can be classified into four categories based on how they affect the sourcing firm. The categories are: (1) a consumption service, which does not affect the sourcing company's primary processes, (2) an instrumental service, which affects the primary processes of the sourcing company, but is not delivered to the end customer, (3) a semi-manufactured service, which is delivered to the end customer after transforming it, and (4) componential services, which are delivered to the end customer as is (Wynstra et al. 2006).

Table 2. Research on sourcing strategies and competitive advantage.

Authors	Year	Type	Findings	Industry	Theoretical basis
Murray et al.	2009	Empirical study	Sourcing KIBS requires co-alignment of sourcing strategy		
van der Valk et al.	2009	Empirical study (qualitative)	Buying companies consistently differentiate their interactions for different types of services.		Purchasing and supply management
Safizadeh et al.	2008	Empirical study (quantitative)	The greater the customization and tacitness of knowledge, the more likely the operations stay in-house.	Financial services	TCT, RBV, KBV
Wynstra et al.	2006	Conceptual paper	Four business service applications: as a component, semi-manufacture, instrument and consumable. For each type, interactions have to achieve different objectives.	Business services	Purchasing and supply management
Hult et al.	2004	Empirical study (quantitative)	Knowledge development process affects the cycle time. A supply chain has memory. Shared meaning and information sharing contribute to chain memory and knowledge acquisition.	Not specified	KBV, organizational learning, information processing
Parmigiani & Mitchell	2009	Empirical study (quantitative)	Concurrent sourcing takes place, more likely when there is inter-firm expertise and intra-firm shared expertise.	Not specified	TCT
Murray & Kotabe	1999	Empirical study (quantitative)	Supplementary services are sources globally. Relationship between asset specifity and internal sourcing is moderated by the level of inseparability and transaction frequency. Capital intensity and uncertainty also matter.	Service sourcing by services	TCT
Murray et al.	2005	Empirical study (quantitative)	The effects of sourcing strategy to performance. The relation of sourcing major components to innovativeness, differentiation and uncertainty.	Transitional economies	Resource complementary and resource dependence theory

Murray et al.	1994	Empirical study (quantitative)	Sourcing-related factors (bargaining power of suppliers, proprietary technology, asset specifity, transaction frequency) affect performance that different sourcing strategies (internal, external) produce.	U.S subsidiaries of foreign firms	Contingency approach

As KIBS have been researched from the point of view of sourcing, there are issues, which are also important from the point of view of competitive advantage that is gained from networks. Sourcing takes a stand on where firm boundaries should be, and on the complementarity of resources. Sourcing and supply management literature utilizes TCT and resource-based views as a theoretical basis, and has some explanations as to why service networks may have specific issues. However, sourcing takes a stand only with one type of network, supply networks, and the perspective is too limited for make-or-buy decisions and multiple sourcing – single sourcing decisions. Knowledge creation, knowledge and resource search and customer networks are left out. Competitive advantage is not discussed explicitly, even though the topics, e.g. the performance of a relationship, are also related to competitive advantage.

Research concerning t-KIBS companies (where the essential knowledge is related to science or technology) is done in the area of IT services. In the IT context services have special meanings. In the recent years a SaaS (Software as a Service) business model has gained ground. With a SaaS model a company does not invest in an IT system as with traditional IT outsourcing, but it pays a fee for the service that produces the IT solution (Demirkan et al. 2010). Behind SaaS development is SOA (Service Oriented Architecture). SOA literature broadly handles applications such as network services, digital libraries, data mining and health care, and takes into account the development and implementation of the issues related to SOA (Bardhan 2010). IT services and computer science has been studied e.g. services management, service-level agreements, knowledge management and business process analysis (Bardhan 2010), and thus also takes into account business-related issues of IT services. Issues like modularity, standardization, and the reuse of solutions are also interesting from the point of view of non-IT services, as they may give insights into the scalability problems of services. Aramand (2008) defines three categories for software solutions, where software services fall between software products and software projects. Products are standardized offerings, and projects involve the most customization. In projects the customer is the one who controls the specifications of the end result, and owns the results, and in products the vendor controls the specification. In a software service customer has no say on the software architecture, but may have custom applications. (Aramand 2008)

The outsourcing of IT is a part of concentrating on core competences, and thus it is also referred to as strategic outsourcing (Demirkan et al. 2010). Producing software service often leads to a complex network of service providers (Demirkan et al. 2010), sometimes referred to as a knowledge value chain (Cha et al. 20008). A value chain in that situation faces different challenges than in tangible goods production, as for example inventory management is not relevant (Demirkan et al. 2010). On the other hand some issues remain the same, such as strategic positioning in the network, and issues like the merging of

traditional functional boundaries, communication and the flow of information between agents has been recognized and discussed in the context of IT outsourcing (Demirkan et al. 2010). Outsourcing should also take into consideration the possible loss of competence as companies give up part of their production to other companies in the value chain in order to reduce costs (Cha et al. 2008). SaaS adoption depends on the willingness to move organizational applications and data outside firm's boundaries, and that willingness is dependent on the trust on vendor community, and trust depends on perceived capabilities and reputation of vendors (Heart 2010). IT outsourcing has been studied from the point of view of competitive advantage (e.g. Ngwenyama & Bryson 1999, Alvarez-Suescun 2010, Mudambi & Tallman 2010, Grimpe & Ulrich 2010). In this study the perspective is wider than just outsourcing, where the focus is on one firm rather than a production system (Miozzo & Grimshaw 2005). Also perceiving companies as t-KIBS allows for studying them in a wider business context rather than focusing on solely IT-sourcing.

In this study I try to understand how the competitive advantage gained in a collaborative network is dependent on the KIBS transaction characteristics. Special characteristics of KIBS companies have been recognized and studied. In studies on supply networks it has been found that companies may gain different competitive advantages from service supply networks that seem to be similarly organized. In sourcing networks it has been recognized that service sourcing differs from goods sourcing. There have been studies (Gebauer 2007, Wittreich 1966, Murray et al. 2009) that suggest that the competitive advantage gained in a network is dependent on the characteristics of transactions, and that the service context deserves to be studied on its own.

Research on IT services allows us to understand the increased reliance of ICT on service provision as well as how services may transform over time and become more product-like so that there is a continuum from product to service and from service to project. This explains how the characteristics of service transactions may also vary and effect transactions. The strategic outsourcing of services also explains how service value chains face the same problems as goods value chains and partly different problems. This suggests that the characteristics of service transactions make a difference in how the value chain should be managed.

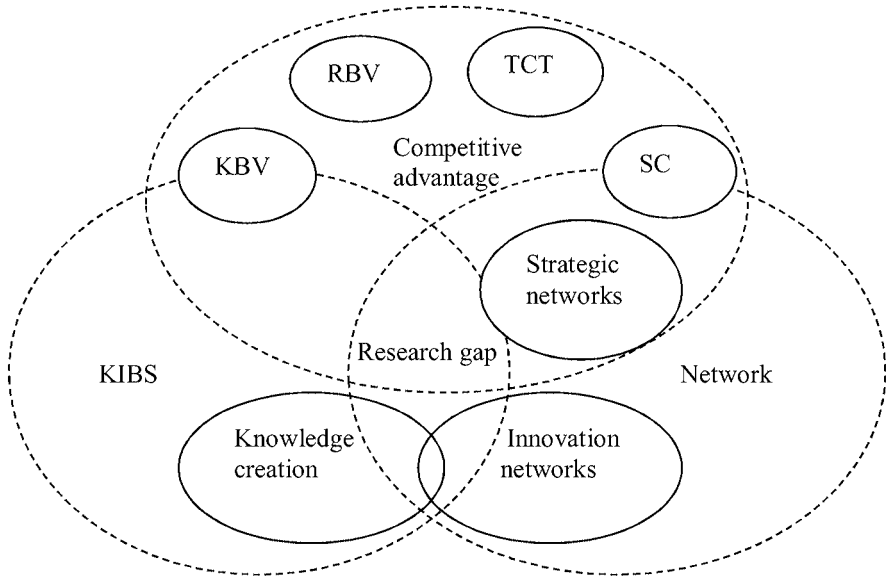
1.3 Research gap

In this chapter the research gap in this study is defined. Competitive advantage can be studied either on network level such as the competitive advantage of the network against other networks, or by choosing a focal company, and studying the competitive advantage that derives from business networks. In this study the focal company's[1] view is chosen.

Figure 4 shows the research gap in this study. Shapes with a dashed line represent the broader research areas that are relevant from the point of view of the research questions in this study. Shapes with solid line represent more specific research areas that are interlinked with research problems and contain well-defined models or theories.

[1] E.g. Porac et al. (2002) defines a network boundary and focal firm to be identified based on the social construction of reality.

Figure 4. Research gap.



In the network research area, the areas that have been covered are emergence of network organization, and network structure, but a strategic perspective has not gained as much attention. KIBS companies and competitive advantage has been researched from the point of view of knowledge as the most important source of competitive advantage for KIBS firms, and it has also been recognized that the relational resources matter for KIBS companies. KIBS companies have also been discussed as parts of innovation systems.

KIBS companies have been researched in the network context as supply networks and sourcing networks. In these studies, it has been found that KIBS companies have special characteristics in networks, and their managerial challenges differ from those in goods production networks. KIBS sourcing differs from sourcing goods or other services because the transactions tend to be complex, co-productive and long-term. KIBS companies pursue strategies that are seldom based on cost-advantage and more often on differentiation. However the competitive advantage gained in collaborative networks of KIBS has not been studied.

In this study, the models that contribute to strategic views of networks are defined as those that explain the competitive advantage gained through networks. The ones that contribute to the area of organization studies, like IMP (Industrial Marketing and Purchasing) perspective (Håkansson & Snehota 1995), are not the center of this study even though they bring a valuable understanding of network structure and activities. In this study the approach is from a competitive advantage perspective. Several benefits that a company can gain from its networks have been recognized in the literature. However those benefits are not linked to the discussion of competitive advantage. In this study the theories are chosen to explain competitive advantage are transaction cost economics, resource-based-view, knowledge-based view and social capital. These theoretical bases have been previously used in both in network context (see e.g. Eisenhardt & Schooven 1996) and in competitive advantage research (Lavie 2006). E.g. Lavie (2006) exploits the relational view and social network theories to extend RBV to a network level. Transaction cost

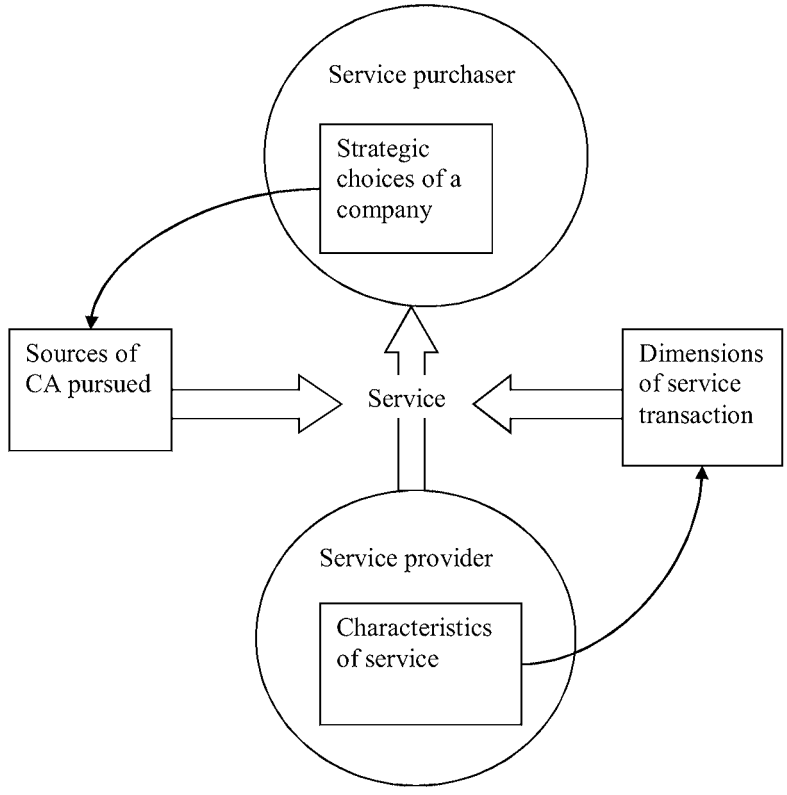
theory is connected to his study as the relational view derives from RBV and TCT (Lavie 2006). On the basis of the explanations these theories offer, the sources of competitive advantage in network contexts are mapped.

A company may take part in several different business networks, which may represent different network types, e.g. a stakeholder network, an innovation network, a distribution or supply network. This study concentrates on business networks and on business relationships, and thus the scope is not as wide as in for example a stakeholder network, and on the other hand, not as narrow as in the supply network. This study limits itself to business-to-business relationships, and thus the end customers are not included in the study. Business networks are entities which are difficult to delineate. There are also networks, where it is difficult to find a central company. Choosing a focal company also defines the network that is a meaningful entity of study. E.g. Håkansson and Snehota (1995) carry out a multiple case study on business networks from the point of view of the focal company.

Since business networks are entities, which are defined according to the current research interest, networks are here limited to ones consisting mainly of KIBS companies. In the real world it is unlikely that companies operate in a network consisting solely of KIBS companies. However in software development it is possible that most of the suppliers are KIBS companies or other service providers. In this study, the networks studied are in the ICT sector, and most of the services studied are IT development services. In this study, IT services are handled not as services in SaaS or SOA sense, but as services that take place between human beings and not technical systems. These kinds of services are a major factor in the growing importance of KIBS, as the demand for technology-related knowledge is increasing (Miles 2005). Thus IT services are treated in this study as technology-based knowledge-intensive business services (t-KIBS), where they are likely to present interesting implications as the service-product division is not as clear as in many other business services due to the intangible nature of software products. The study is not limited only to software-related services, and thus the area of interest is wider than IT sourcing or software development services.

A KIBS company may in any given transaction be either the supplier or recipient, and the other party may or may not be a KIBS company. Figure 5 illustrates what aspects of transactions are of interest in this study. On the other hand the interest is on the recipient side, as KIBS companies are assumed to search to some extent for different competitive advantages from a network than other companies. However, major attention is paid to the supplier side and how sourcing of KIBS is different from sourcing other services or products. The special nature of transactions of KIBS providers is such that it arises from the characteristics of KIBS provided.

Figure 5. Research interests of the study.



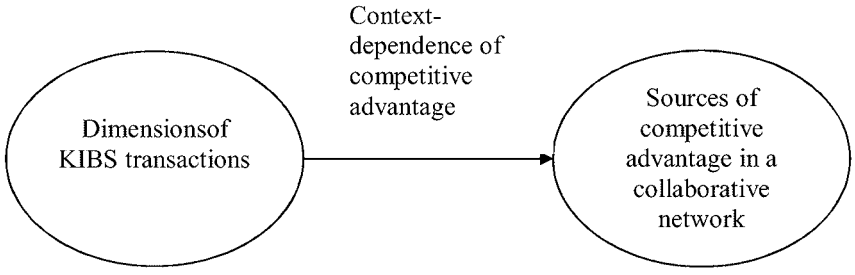
In figure 5 presents o companies, either of which can be a KIBS company. If a sourcing company is a KIBS company that affects the sources of competitive advantage the company is likely to pursue in the network. Previous studies (Gebauer 2007, Lindahl & Beyers 1999, Bharadwaj et al. 1993) suggest that KIBS companies differ from other services and goods providers in the sense that their competitive advantage is seldom based on cost-efficient strategies, and more often on differentiation. Thus the sourcing company's strategy is likely to affect the sources of competitive advantage it seeks in its network. On the other hand, suppliers of KIBS have characteristics that have an effect on the business relationship between the supplying company and its client (Murray et al. 2009, Bettencourt et al. 2002, Miles 2003, Glückler & Armbrüster 2003, Evanschitzky et al. 2007, Reid et al. 2001). Those KIBS characteristics effect the transactions between companies, and may have implications on the sources of competitive advantage that are gained through networks.

In this study the focus is in recognizing the potential sources of competitive advantage that companies gain through a KIBS network, the special characteristics of KIBS that affect to gaining that advantage, as well as on the strategies that a KIBS chooses and the competitive advantage they pursue. The goal of this study is to increase understanding on the characteristics of KIBS's networks that affect competitive advantage gained in networks, and on the sources of competitive advantage KIBS providers pursue within networks.

1.4 Research problem

Based on the literature I know that companies can gain competitive advantage in collaborative networks (Dyer 1996), and the competitive advantage gained differs even in networks that resemble each other (Dyer & Hatch 2006). I also know that KIBS transactions have certain characteristics which affect their relationship and network formation, and the actions within those networks (Murray et al. 2009). Thus, I am interested in the sources of competitive advantage that can be gained in a collaborative network, and how the context of transactions (in this case the dimensions of knowledge-intensive business services) affects to the competitive advantage gained (figure 6).

Figure 6. Research problem.



The research problem is the following:

> **How do characteristics of knowledge-intensive business services affect the competitive advantage gained in a business network?**

Research problem suggest that there is *competitive advantage* that companies can gain in *business networks*. That competitive advantage is context-dependent, and a company should base its *network strategy*, which is chooses either intentionally or unintentionally to gain that competitive advantage, on characteristics of goods or services transactions that take place in the network. In this study the services that form the context for competitive advantage gained are *knowledge-intensive business services*. Central concepts underlying the research problem are defined in chapter 1.7.

To solve the research problem four research questions are posed:

1. What are the sources of competitive advantage in general?
2. What are sources of competitive advantage gained in a collaborative network?
3. What are characteristics of knowledge-intensive business service transactions?
4. What are the links between sources of networked competitive advantage and KIBS transaction characteristics?

The problem is approached first by answering the question "what are the sources of competitive advantage in general?" The question is answered theoretically by recognizing the sources of competitive advantage that companies pursue in general, and specifically in the network context. Strategy literature is discussed to discover the perspectives of

strategic thinking that resonate with a network strategy concept. Competitive advantage is discussed to discover the general sources of competitive advantage.

Secondly, I answer the research question "what are the sources of competitive advantage gained in a collaborative network?" As I have uncovered the general sources of competitive advantage, I examine how they are transferred into a network context. Also network strategies that have been suggested in literature are studied in order to find the sources of competitive advantage are underlying those strategies.

Thirdly, to understand the special characteristics of sourcing KIBS I study the characteristics of knowledge-intensive business service transactions. I look for the characteristics that affect business relationships, and recognize the interdependencies between those KIBS characteristics that are suggested in the existing literature. Looking at those characteristics, and finding out how those characteristics are interdependent with network relationships, KIBS companies also increase the understanding of KIBS.

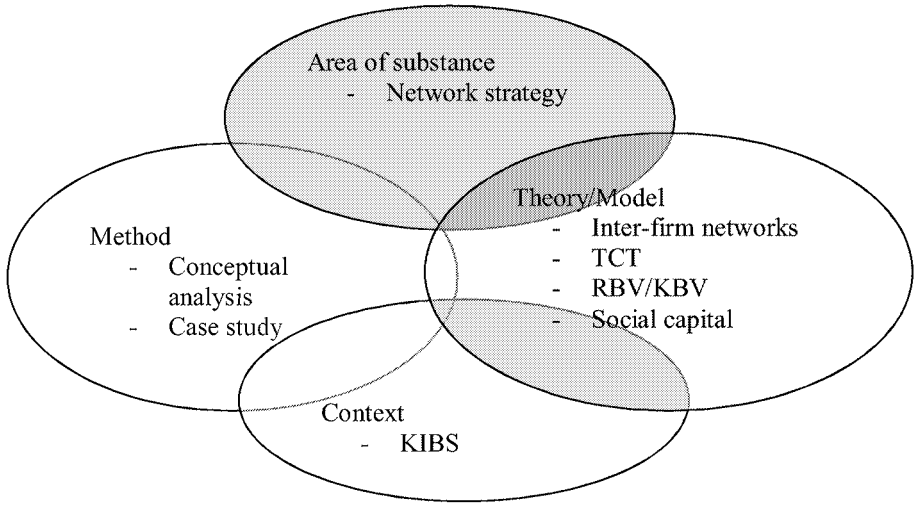
KIBS companies and their business relationships have been characterized by their dependence on special knowledge, long-term relationships, collaborative production, and a lack of competition on price. Finding interdependencies between characteristics allows the recognition of KIBS characteristics that may pose limitations and create possibilities for competitive advantage gained in KIBS networks. It also brings a new understanding of KIBS as the sources of competitive advantage that KIBS companies utilize are likely to differ from the ones that other companies utilize.

Finally I answer the question; what are the linkages between sources of networked competitive advantage and KIBS transaction characteristics. I study this first theoretically by searching for interdependencies between KIBS transaction characteristics and competitive advantage gained in a network. I also form a theoretical framework based on the theoretical findings. Then the question is answered empirically by analysing the empirical findings on the theoretical framework, and completing the theory if needed. The case studies bring complementary understanding on the interdependence of different KIBS characteristics and the competitive advantage companies can derive from a network, or it may contradict some of the assumptions. Focal companies studied produce both KIBS and their units, whose network strategies are studied in cases, have formed relationships to providers of KIBS. Thus the competitive advantage they search for is affected by their aspirations as KIBS providers, and also by the special characteristics of sourcing KIBS. This setting also causes a need for studying the strategic choices of KIBS companies in general, as it affects to the sources of competitive advantage they pursue in networks.

This study's areas of substance are KIBS and network strategies (Figure 7). The theoretical bases are network theory (which, as noted earlier, arises from several theoretical bases, and thus there is no single theory but rather a family of models and theories), TCT, RBV, KBV and social capital. In the context of studying inter-firm networks are KIBS companies. The method used is a hermeneutical analysis in case studies. The most important contributions are in the areas of substance and context. Networks have seldom been studied from a strategic point of view, and there is a lack of studies that present KIBS companies in a network context, besides innovation networks,

where KIBS companies are treated as transmitters of knowledge and contributors of innovation to other companies.

Figure 7. The areas of contribution of the study.

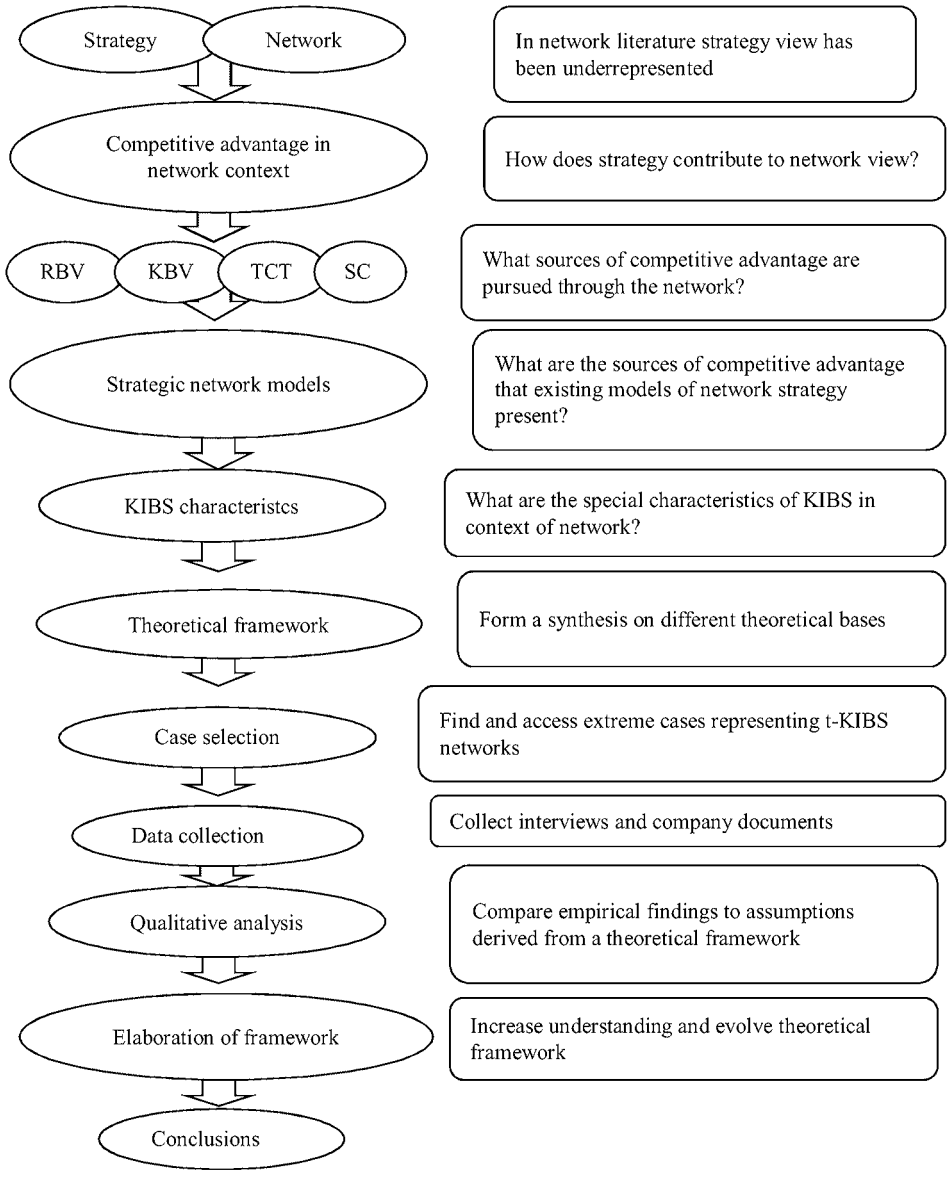


Research methods are a conceptual analysis on the existing literature, and case studies to gain more understanding of the subject. Methodologically, this study does not bring newness to the study of networks or KIBS companies, as a conceptual analysis and case studies have been a common method in the field.

1.5 Research strategy

Figure 8 illustrates how the study proceeds to answer the research questions. The left-hand side of the figure describes how the study builds a theoretical framework and uses that framework to analyze empirical data to end up with conclusions. The right-hand side poses the question which each phase responds.

Figure 8. Research strategy.



A literature study is carried out in order uncover the relevant frameworks that have been suggested for strategizing in networks. The strategies found are evaluated in terms of the competitive advantage they aim at, based on earlier mapping.

The theoretical framework utilizes recent journal articles and books. They are sought by ISI Web of Science. The terms used in the search are "strategy AND network", "strategic network", "network strategy", "network management", "competitive advantage AND network", "competitive advantage", "transaction cost theory", "resource-based view", "knowledge-based view", "social capital", "knowledge-intensive service", and "knowledge-intensive AND network". Since the literature on the competitive advantages of a network is underdeveloped, there are a wide range of theories used, and thus the literature also contains several term combinations in order to find all relevant

contributions. The relevant literature was also found by forward and backward referencing of articles. Theoretical framework brings together potential sources of competitive advantage and models of network strategy. Each model of network strategy is analyzed; the network characteristics it presumes and the sources of competitive advantage are presented.

The choice of a research method is dependent on the research question and also on the phenomenon under research. A case study is best suited to ask why and how contemporary organizational phenomena occur (Lee 1999, Yin 2003). The phenomenon under study has a real-life context, and such that the investigator has little control of it. A case study method is natural when studying phenomena, which is difficult or impossible to study otherwise. A case study may be the only chance to embrace all relevant aspects on the subject under study. Research on business network strategies has been largely case study based (see e.g. Jarillo 1993, Möller et al 2003, Håkansson & Snehota 1995), which might be because of the lack of a core theory to test.

Stake recognizes three types of case studies. An intrinsic case that study aims at increasing understanding on that particular case. An instrumental case study is intended to provide insight into an issue that the case represents (representative case). An instrumental case facilitates understanding and may allow generalizations. (Stake 2000) In this study the cases are instrumental. Case studies arise from the theoretical framework that has been built and aims at an increased understanding on the subject.

The case studies cases are chosen for theoretical, not statistical reasons, that is called theoretical sampling (Eisenhardt 1989). Eisenhardt (1989) recognizes that cases may be chosen to "replicate previous cases or extend emergent theory, or they may be chosen to fill theoretical categories and provide examples of polar types". In this study the goal is to extend emerging theory. The case studies are intended to bring new insight on the constraints of the theoretical framework. To achieve that goal, the chosen cases should be extreme cases. Extreme in the sense the case units represent a wide variety of possible sources of competitive advantage in a network. The case units also represent somewhat differing strategies in their network, and thus allow learning. The selection was also based on which companies were willing to allow the researcher to interview employees and see their internal documents. In this study, the aim is to use investigator triangulation by interviewing several people on the same subjects, and also by interviewing people in different organizations. The study aims at a new understanding of the competitive advantage that companies gain in networks by building a theoretical framework and assessing and extending that framework using case studies. Case studies aim at analytic generalization, and are not intended to provide statistical relevance.

1.6 Structure of the thesis

The structure of the thesis is the following: Chapter 1 introduces the topic. The research area is presented, as well as the research gap and the research problem. The most important concepts are defined. In chapter 2 strategy and competitive advantage literature are studied. The main strategic schools of thought are presented and their prominence to

explain competitive advantage gained through a network is discussed. Sources of competitive advantage gained through networks are recognized with four theories: Transaction cost theory, resource-based view, knowledge-based view and social capital theory. Chapter 3 is concerned with network strategies. The strategies that have been suggested for managing business networks are studied in order to find out what sources of competitive advantage they are expecting to gain with networks. Network strategies are also assessed in terms of what they assume about network boundary, the power of network centers and the strength of network bounds. In chapter 4 KIBS characteristics in networks are recognized. Earlier research on KIBS is reviewed in order to find out the characteristics of KIBS that have an effect on the competitive advantage that is sought in networks. The characteristics are sought for both as characteristics of KIBS that affect the transactions, and the features of KIBS which affect the strategies they choose. Based on the characteristics and earlier findings on competitive advantage, a theoretical framework is constructed in chapter 5. The theoretical framework presents the interdependences between KIBS characteristics and sources of competitive advantage that are assumed to be gained.

Chapter 6 presents the research strategy for the empirical part of the study. The research is a qualitative study, and the research method is a hermeneutical analysis. The empirical data are gathered within three case studies, which as a whole consist of interviews and documents. The case studies aim at increasing the understanding on the framework constructed in previous chapter, and the results are descriptive rather than normative in nature. In chapter 7 the empirical findings of the case studies are presented. Each case is analyzed on its own under subthemes that have been found to be relevant based on the theoretical framework. In chapter 8 the findings of the case studies are discussed based on the assumptions derived from theoretical framework. The findings of each case are used to complete the framework. Chapter 9 includes conclusions on the research. The main results of the study are reviewed, as well as the limitations of the study and a generalization of the results. Further research themes are suggested.

1.7 Definitions

1.7.1 Knowledge-intensive business service

The distinctive features of KIBS come from two sources: Knowledge-intensity and service production. A service can be defined as "to some extent intangible deed or a series of deeds solving a customer's problem; most commonly so that the customer, service staff and/or physical resources or goods supplier and/or service provider's systems are interacting" (Grönroos 2000, p. 52). Services have often been defined through how they differ from goods. Client-intensity, intangibility, co-production, importance of ICT, difficulties with scalability are commonly mentioned (Miles 1998, Bharadwaj et al. 1993). This view has been contradicted e.g. by Leiponen (2000), who claims that only higher intangibility and co-production really are specific to services, and the special nature of services is exaggerated (Leiponen 2000). The intensity of client interaction is a firm-specific and subindustry-specific characteristic, depending on the degree of customization (Leiponen 2000). Co-production requires the close involvement of front and back offices

Vermeulen & van der Aa (2003). Intangibility makes it necessary to communicate intensively with the customer Vermeulen & van der Aa (2003).

Tether and Hipp (2002) list the following characteristics as the peculiarities of services:

- the close interaction between production and consumption
- the intangible nature of service outputs
- the key role of human resources in service provision
- the critical role of organizational factors in a firm's performance
- the weakness of intellectual property protection in services (Tether & Hipp 2002)

Four different types of services have been recognized: Supplier dominated sectors include public services and retail trade. Production-intensive services are divided into network services, which are dependent on ICT networks, like banks and telecommunication services, and scale-intensive services, which are dependent on physical networks, like transportation. The fourth category is specialized technology suppliers and science-based services. (Soete & Miozzo 1989) These service classes have differences in their competitive logic. They also vary in average firm size, since supplier-dominated and specialist supplier firms are relatively small whereas scale-intensive, information intensive and network services are large in size (Tether et al. 2001). In each sector, companies perform service activities that can be considered knowledge-intensive (Tether et al. 2001). The opposite end of service spectrum can be considered to be mass service organizations and professional service organizations. Professional service organizations have low frequency of transactions, long client contact times and a high level of customization. Mass services have a high number of transactions, and short client contact time. (Silvestrou in Tether et al. 2001)

In contemporary work, there is a high level of knowledge present, but it is essential that in a knowledge-intensive organization knowledge brings competitive advantage to the firm (Paton 2009). Knowledge-intensive service activities (KISA) also include the service activities in also organizations that are not the sole service providers (Miles 2003). An activity is knowledge-intensive, if it "relies on a substantial body of complex knowledge" (Nordenflycht 2010). KISA can be recognized based on the quality of the input, output or knowledge flow (Tether & Hipp 2002). According to Starbuck (Starbuck 1992), the term knowledge-intensity refers to similar dependence as capital-intensity and labour-intensity, and thus a knowledge-intensive firm is one where knowledge is the most important input. Tether and Hipp (2002) characterize KIBS by their ability to collect information and knowledge externally and combine it with internal knowledge to into service outputs. These services are often highly customized and customer relationships are close (Tether & Hipp 2002). According to Miles (1998) knowledge-intensive business services require input knowledge to be professional. Knowledge-intensive service organizations exploit and produce high-level knowledge, which distinguishes them from information-intensive service organizations. Toivonen (2004) defines KIBS as "business service companies, i.e. private service companies which sell their services on markets and direct their service

activities to other companies or to the public sector. They are specialised in knowledge-intensive services, which means that the core of their service is contribution to the knowledge processes of their clients, and which is reflected in the exceptionally high proportion of experts from different scientific branches in their personnel."

In this study knowledge-intensive business services are understood as the offerings where services play a more important role than goods, and which are produced using complex knowledge.

1.7.2 Business network

A business network is a meaningful combination of organizations interlinked through business relationships. Håkansson and Snehota consider "a relationship [to be] mutually oriented interaction between two reciprocally committed parties" (Håkansson & Snehota 1995, p. 25). Recent studies in business relationships emphasize that nowadays all business is networked business, and business relationships have an impact on each other. Thus business relationships should be studied in the context of connected networks of relationships instead of dyadic relations (Blankenburg Holm et al. 1996). Also, competition is considered to take place between business networks, and not between individual companies (Iansiti & Levien 2004, Blankenburg Holm et al 1996).

Jarillo (1988, p. 32) considers strategic networks, which are constructed around a strong hub company, are "long-term, purposeful arrangements among distinct but related for-profit organizations that allow those firms in them to gain or sustain competitive advantage vis-à-vis their competitors outside the network".

Ford et al. find the following characteristics for a business network:

- Networking is interactive
- Networking is based on restricted freedom
- Networking is not defined by conventional company categories
- Networking involves combined cooperation and competition
- Position and experience are central factors in networking
- Networking is based on incomplete knowledge
- Networking copes with the network paradoxes (Ford et al. 2002).

The business network concept presents itself in various phenotypes in the real world. Möller, Rajala and Svahn (2004) classify business networks into three basic types. Those are; current business nets, renewal nets, and new business creation nets. Miles and Snow (1992) divide networks also into three classes; stable, internal, and dynamic. In both classifications, important characteristics are considered to be the stability of the structure and the innovation potential of the network. A possible division is the classification of

networks into hierarchical networks with a leading company and into networks with equal partners (Valkokari et al. 2006). Pfohl and Buse (2000) divide networks on the basis of levels of integration to strategic networks, virtual enterprise, regional networks, and operative networks.

A business ecosystem is a recent concept, first introduced by Moore (1993). A business ecosystem is a concept emphasizing the strong impact that a company can have on other companies and the competition between ecosystems, not within it (Moore 1993, Iansiti and Levien 2004). They also claim that business ecosystems have a focal firm, which is crucial for the survival of the business ecosystem as a whole.

In this study a business network is understood to consist of collaborating companies that are interacting in production, knowledge exchange or other activities to supply products. A company can be a member of several networks that are defined in different ways in terms of network boundary and centrality dependent on the context and interest of study.

1.7.3 Network strategy

There is a number of overlapping terms linked to strategizing in a network. Strategic network, network strategy, networking strategy and networked company are the most frequently used. Networking strategy and network strategy are often used interchangeably. Networking strategy refers, to a large extent, to the actual process of forming new ties and links. Network strategy often refers to a strategy created in collaboration with network members (e.g. Valkokari et al. 2006). Network strategy is a concept mainly referring to strategizing in a networked environment and thus is more relevant from the point of view of this study. According to Rowley and Baum (2008), a network strategy is a strategy that is actively seeking a network advantage. The network advantage is sought by shaping network positions and structures (Rowley & Baum 2008). Håkansson and Ford (2002) explain that strategy in complex networks aims at influencing others when possible and taking advantage on their resources, initiatives and creativity. Attempts to gain a favorable position in a network is a part of network strategy, but changing one's position in a network is a major strategic change and is not done quickly (Håkansson & Ford 2002). Neither of these terms, networking strategy or network strategy, refers to a strategy that is mutual for all companies in a network.

The link between strategy and network can also be seen so that network is a model of strategic organization (Rowley & Baum 2008). Jarillo (1993) defines a strategic network is an organizational form built on two previous organizational forms, vertical integration and subcontracting. According to Jarillo, in a strategic network "one company takes the role of 'central controller' and organizes the flow of goods and information among many other independent companies, making sure the final client gets exactly what he or she is supposed to get, in an efficient way". (Jarillo 1993)

Networking company refers to a company that is building a network of relationships to a gain competitive advantage (Ritter 1999). An important question when talking about competitive advantage of networks is who the benefiter is. As the chosen strategies are

likely to be collaborative, all parties should gain the benefit of the collaborating network. A network strategy should try to overcome managerial challenges arising from networking. Those are complex and slow decision making, differences in organizational cultures and in strategic intents (Håkansson & Snehota 1995). A challenge is also in the dependence on specialized resources of other companies and the risks arising from that (Möller et al. 2005, Iansiti & Levien 2004).

In this study, the network strategy is understood as follows; a strategy seeking a competitive advantage in a network by shaping that network, creating network- and relation-specific resources and changing information transfer in the network to gain a more favorable network position and greater access to resources.

1.7.4 Competitive advantage

Competitive advantage is commonly understood as attributes and resources of an organization that allow it to outperform others in the same industry or product market (Chaharbaghi & Lynch 1999). Competitive advantage leads to the superior performance of a firm. That performance has been explained to be due to rents that are seen to be a monopoly, Ricardian or Schumpeterian depending on the author (Powell 2001).

A resource-based view is a leading theory of competitive advantage (Powell 2001). Peteraf (1993), who represents the RBV view, claims that the cornerstones of competitive advantage are heterogeneity, ex post limits to competition, imperfect mobility and ex ante limits to competition. Heterogeneity enables Ricardian rents, ex post limits to competition sustains the existence of those rents, imperfect mobility keeps the rents within the firm, and ex ante limits to competition prevent that rents are offset by costs (Peteraf 1993).

Barney (1991) defines that a firm has a competitive advantage when it is implementing a value creating strategy and not simultaneously being implemented by any current or potential competitors. Porter (1990) explains that the basic units of competitive advantage are activities that both create value for customers and generate costs for the firm. The difference between value, that is, what buyers are willing to pay for a product or service, and the costs of performing the activities involved in creating it, determines profits (Porter 1990). In Porter's view there are two basic types of competitive advantage: cost leadership and differentiation (Porter 1990). Competitive advantage has been recognized on all levels of the business unit, firm, corporation and industry (Powell 2001).

In this study, competitive advantage is understood to be the edge that a company gains over its competitors. Competitive advantage depends on the resources and/or position that either allows a company to bring value to customers or lowers the production costs of a company.

2 STRATEGY AND COMPETITIVE ADVANTAGE

> "When strategy is conceived as the management of relationship and networks, the primary focus ceases to be the internal allocation and structuring of resources, and becomes the way in which the organization relates its activities and resources to other parties in the network." (Baraldi et al. 2007)

In this chapter, the strategy is discussed to explore different perspectives on strategic thinking and their basic assumptions. The goal is to find out what grounds of strategic thinking are suitable for strategizing in business networks. Furthermore potential sources of competitive advantage are discussed to recognize the fundamental sources of competitive advantage. Potential sources of competitive advantage are studied through different theoretical frameworks: Transaction cost theory, resource-based view, knowledge-based view and social capital view. The goal of the chapter is to form a theoretical basis for considerations of competitive advantage in networks. In the end, the sources of competitive advantage are combined to form map of potential sources of competitive advantage in a business network context.

2.1 Schools of thought

Strategy can be defined as a "determination of the basic long-term goals and objectives of an enterprise, and the adoption of courses of action and the allocation of resources necessary for carrying out these goals" (Chandler 1962). However, there is no consensus on a definition of strategy. Strategy is multidimensional, situational, varies across industries and thus is not easy to fit into a single definition (Chaffee 1985). Mintzberg, Ahlstrand and Lampell (1998) recognized ten schools of thought concerning strategy formation. According to them, the first three schools of thought are descriptive: the design school, the planning school, and the positioning school. Six are prescriptive schools, the entrepreneurial school, the cognitive school, the learning school, the power school, the cultural school and the environmental school. A combination of these is the configuration school. (Mintzberg et al. 1998) In these schools, one can recognize five analogies for a strategy. Those analogies are: strategy as a plan, strategy as a pattern, strategy as a position, strategy as perspective and strategy as a ploy (Mintzberg et al. 1998).

The strategy schools have been classified in three groups, which however they are not totally independent: Rational (linear) strategy, adaptive (action) strategy and interpretative strategy (Chaffee, 1985; Hendry, 2000). Rational strategy focuses on planning: Strategies are designed at one time and implemented on another, and thus the environment is assumed to be relatively predictable or rather insignificant (Chaffee, 1985). Decision

appears to be and intentional choice and strategy realizes as an enacted plan (Hendry, 2000). Top managers are viewed as being capable of changing the organization to large extent. Environment is seen as an unavoidable nuisance that is out there, consisting mostly of competitors (Chaffee 1985).

Adaptive strategy supposes that monitoring of environment and making changes are simultaneous and continuous functions, and tends to be less centralized or integrated (Chaffee, 1985). Strategy is interpreted to be a pattern of behaviour, and decisions are decisive acts, like commitment of resources, and strategic intentions are irrelevant (Hendry, 2000) A focus on strategy making is more on the means than on the goals. Adaptive strategy is less centralized or integrated, and more multifaceted. An environment is a complex organizational life system, and the boundary between organization and its environment is highly permeable. Adaptive models rely heavily on evolutionary biological models of organizations (Chaffee 1985).

In adaptive strategy organization ecology is a central perspective. Organization ecology differs from earlier strategic views mostly because it recognized that organizations do not face an environment, but other organizations. Thus the potential success of any strategy depends on the strategies that other companies choose. Population models from ecology where chosen as an analogy because population models clarified the processes within organization populations. (Hannan & Freeman 1989) Organization ecology as such does not provide advice for the management of a business network. In organization ecology, the unit of observation is either the individual organization or population, usually an industry (Hannan & Freeman 1989). Organization ecology determines what defines an optimal organizational form based on transaction costs and the closure of social networks. (Hannan & Freeman 1989) Thus social networks are assumed to affect firm size and industry structure, but networks are not in the focus of organization ecology.

The interpretive strategy model is based on a social contract. The social contract view portrays an organization as a collection of cooperative agreements entered into by individuals with free will. The model assumes that reality is socially constructed. Strategies are motivated to believe and to act in ways that are expected to produce favourable results for the organization. An interpretive model does not contain all of the characteristics of adaptive or linear models, and adaptive models do not contain all aspects of linear models. In the future one might delineate the circumstances under which one model of strategy is more appropriate than others. (Chaffee 1985) Strategy is here either a pattern of behaviour or a shared cognitive schema, and what appears to be an intentional decision is a retrospective rationalization of prior action; decision is needed for sense-making and legitimation (Hendry, 2000)

Jarzabkowski and Wilson (2006) recognize four branches of strategy literature. Positioning school theory is based on industrial economics. Capacity-building theory contains concepts like RBV, core competences and dynamic capabilities. Hypercompetitive or high-velocity theory provides strategies for rapidly changing environments. Ecosystems and complexity theory is a perspective where competitive advantage is seen to arise from a firm's position in an ecosystem. These classifications of strategic thinking are rather similar. The Mintzberg, Ahlstrand and Lampells descriptive

schools correspond roughly to the linear strategies of Chaffee and the positioning schools of Jarzabkowski and Wilson. An adaptive strategy is present in environmental and learning schools, as well as in an ecosystem and complexity theory. There is also likely to be similarities in the configuration school and in high velocity theory. Interpretive strategies are found in at least the power, cultural and cognitive schools.

The school tagged planning, linear or positioning has lost its footage as industrial organization paradigm has encountered challenges it has been unable to answer. The planning period became discredited because, as the planning became more elaborate, the predicted results were frequently inaccurate since planning was increasingly divorced from actions of the organization (Ansoff 1987). Strategies based on linear planning are likely to encounter significant problems if employed in a networking company. The more complex and distributed the actions of a company are, the further the plans will be from the realized results (Ansoff 1987). Linear strategies also neglect the environment to a large extent (Chaffee 1985), and for a networking company the environment is highly important.

Since evolutionary economics has had an effect on strategy thinking, the industrial organization paradigm has challengers. What is called the environmental school or adaptive strategy does not treat the environment as a residual as in many other strategy schools. The environmental school grew out of contingency theory that assumes the best possible strategy is to depend primarily on environmental characteristics. A representative of the environmental school is population ecology introduced by Hannan and Freeman (1989). A broad question arising from population ecology and the environmental school is what role strategy has in selection and variation (Mintzberg 1998).

In network theories there are models inspired by the adaptive school and on the other hand the linear school, but the interpretative school is largely underrepresented. Linear network thinking has been clear in the cluster concept. Rational planning does not fit into networks and the positioning school does not recognize collaborative strategies (Baraldi et al. 2007). The adaptive school has inspired several ecological models of business networks. The interpretative school is lacking, but this is not likely because of its inappropriateness, but rather the complexity required in applying anything other than dyadic relationships. There is potential for the configuration school to contribute to the network context (Baraldi et al. 2007).

The assumptions of adaptive strategy-making reciprocate a networked business environment. Since the environment is seen as a complex organizational life system, and the boundary between a company and its environment is seen as permeable (Chaffee 1985), companies can exploit each other's resources and let information transfer. An interpretative strategy also would fit with networking organizations. Basing on the concept of social contract (Chaffee 1985), interpretative strategies emphasize the negotiation and contracting side of a networked organization. Interpretative strategies are likely to be important when a company is forming a network and during the actual networking process.

Table 3. Studies on adaptive network strategies.

Author	Year	Type of study	Area of contribution	Theoretical foundation
Astley & Fombrun	1983	Conceptual	A theoretical framework for collective action	Population ecology, social ecology
Nielsen	1988	Case study	Theoretical framework for cooperative strategy	Evolutionary biology, game theory, ecology
Moore	1993	Conceptual	A managerial framework	Complex evolving systems
Iansiti & Levien	2004	Case study	A managerial framework	Complex evolving systems
Teece	2007	Conceptual	Theoretical framework	Dynamic capabilities
Garnsey & Leong	2008	Case study	Theory application	Evolutionary theory, RBV
Li	2009	Case study	Theory application	Ecology
Pierce	2009	Case study	Theory application, framework development	Dynamic capabilities

Table 3 shows a collection of contributions to adaptive network strategies. Based on various ecological approaches there have been contributions to collective actions and cooperative strategies (Astley & Fombrun 1983, Nielsen 1988).

Strategic management literature is concerned with the question why firms succeed or fail. Essentially bound up with this question are problems as to why firms differ, how they behave, how they choose strategies and how they are managed. This group of questions could also be voiced as "Why do some companies have a competitive advantage over others?" (Porter 1991).

2.2 Competitive advantage

There are three generic competitive strategies that bring competitive advantage. These are overall 1) cost leadership, 2) differentiation and 3) focus (Porter 2004). Drucker (2001) recognizes four generic business strategies: 1) first and best, 2) hit them where they are not, 3) specializing in a niche and 4) changing the characteristics of the market. Porter concentrates heavily on the competitive side of business. However he recognizes that in most industries companies are mutually dependent and a firm can choose to pursue the interests of the industry as whole or it can behave in its own narrow self-interest. Strategies that benefit the whole industry are called cooperative (Porter 2004). In the strategies recognized by Drucker (2001) "first and best" and "hit them where they are not" are of a competitive nature. Specializing in a niche is a strategy that avoids competition. A company may utilize a combination of these strategies, and thus it is likely that most companies are utilizing neither a purely competitive or purely cooperative strategy. According to Drucker, in business strategies the strategy itself may be regarded as an innovation bringing value to a product or a service (Drucker 2001).

Strategic choices aim at gaining a competitive advantage over others. Competitive advantages can be divided into two basic types: a lower cost than rivals, or the ability to differentiate and command a premium price (Porter 1991). Cockburn et al. (2000) interprets competitive advantage as arising through earlier or more favourable access to resources, markets, or organizational opportunities. The role of strategy is thus to provide unusual foresight or the ability of firms' management to create a competitive advantage (Cockburn et al. 2000).

The most common explanations of competitive advantage are traced back to resources and position (Ryall & Sorenson 2007). Companies in central positions enjoy a competitive advantage, but it is reasonable to ask if central position is valuable only because of the access to valuable capabilities and resources it provides (Ryall & Sorenson 2007). Competitive advantage is also affected by institutional factors (Oliver 1997). This means that social factors interfere with choices concerning resources. Entrepreneurs are not rational decision-makers. There may be institutional factors that either hinder or boost the advantage a company gains from its resources (Oliver 1997). The value of a central position is a possibility to be in the nexus of innovating. If a firm promotes effective distribution of information and knowledge it can gain a competitive advantage. Competitive advantage then arises from unique access to other units' knowledge or practices. (Tsai 2001)

Strategic planning has been suggested as a source of competitive advantage, but at least resource-based view theorists claim that strategic planning does not satisfy the criteria for a source of sustainable competitive advantage unless it provides economic value, is scarce and imperfectly imitated (Powell 1992). Absolute competitive advantage can accrue from either resource or positional scarcity, but it is questionable if competitive advantage can arise as a stable outcome of strategic investments (Ryall & Sorenson 2007). However, since resources can be seen as instrumental to competitive advantage, management must effectively bundle and deploy them for an advantage to be realized (Sirmon et al. 2008). Thus strategy does have an effect on the realized competitive advantage. Strategy creates value as it defines how the company links together valuable resources: Knowledge and relationships (Normann & Ramirez 1993).

Table 4. Sources of competitive advantage.

	Position	Resource	Strategy	Innovation	Institutional factors
Conditions	Central position	Specialization, earlier or more favourable access to resources	Economic value, scarcity, imperfectly imitable, brings foresight		
Combina-torities	Combined with resources		Combined with resources or position	Combined with position	Combined with resources
Authors	Ryall & Sorenson (2007)	Porter (1991), Drucker (2001), Cockburn et al. (2000), Ryall & Sorenson (2007)	Cockburn et al. (2000), Powell (1992), Sirmon et al. (2008)	Tsai (2001)	Oliver (1997)

Table 4 presents the sources of competitive advantage at a general level. Resources are the only source that are claimed to be a source of competitive advantage in their own. Position is also an important source of competitive advantage, as other sources often have to be combined with a favourable position to bring competitive advantage. Since most authors describe competitive advantage as being dependent on resources and position, they are here considered to be the primary sources of competitive advantage, and other sources are derivative of them.

There are two general types of competitive advantages: a lower cost than rivals and specialization. I assume that competitive advantage in networks is partly due to similar sources as a competitive advantage in general: resources and position. Advantages that are interconnected with position are the possibility to organize market with network members and grown competitive power. Network advantages leading to enhanced resources are co-specialization, economies of scale, high quality, capabilities and information from indirect and direct partners, and most significantly, access to new markets and information. Exclusive sources of competitive advantage in business networks are mutual learning, better information and resource flows, better adaptation and risk sharing. Important sources are also enhanced intercompany processes, like faster innovation process, technology complementarities, shorter lead time and the convergence of industry segments. Miles and Snow (1992) claim that companies enjoying network advantages will fail if they do not deeply understand network organization. The benefits that can be gained from network are recognized, as well as the hindrances that come from network dependencies, but they are not treated as a part of a larger strategic view.

2.3 Theories explaining competitive advantage

A company can gain a competitive advantage with lower costs. Thus lowering transaction costs may allow a company to access valuable resources in a network at lower costs than competitors. Here the transaction cost theory is used to explain the ways to lower those costs. The resource-based view and the knowledge-based view are revised to find out what kind of resources can bring a company competitive advantage. The social capital view allows an understanding of the kinds of network positions that are valuable and in what ways that value is realized.

2.3.1 Transaction cost theory

Transaction cost theory (TCT, also called transaction cost economics, TCE) is a theory explaining existence of firms and markets. Transaction cost theory provides network research with a basic understanding of the kinds costs that are in the interfirm cooperation. TCT can partly explain the sources of competitive advantage a networking company can enjoy.

The idea that lies under transaction cost theory was made explicit for the first time in an article by Coase in 1937. He noticed that there is a gap in economic theory; on the one hand it was assumed that resources are allocated by a price mechanism, and on the other hand it was assumed that resource allocation is dependent on the entrepreneur-coordinator (Coase 1937). Coase explained the emerging resource allocation by bounded rationality in markets, which causes transaction costs, and on the other hand by inefficiencies if a company internalizes all operations. Williamson (1975) developed the theory further by explaining that market failure creates the need for firm hierarchy. Transaction cost analysis of organizations has been carried out at three levels: defining firm structure, defining an efficient boundary for a firm, and organizing human assets (Williamson 1981).

The basic assumptions of TCT that distinguish it from neoclassical economics are (1) bounded rationality of human agents and (2) opportunism of at least some of the agents (Williamson 1981). Inside a company prices are assumed to be known, contracts complete, and adaptation easier (Williamson 1975). Bounded rationality and opportunism cause operations in a market to have a cost, some of which are saved when internalizing an operation (Coase 1937). The question transaction cost economics tries to answer is why there is any market, if it causes extra costs (Coase 1937). A question derived from this is; what are the forces that determine the size of a firm, as the firm size is dependent on which transactions the entrepreneur decides to organize within the firm and which to buy from the market (Coase 1937).

An explanation for the firm size is that as a firm gets larger there may be decreasing returns to the entrepreneur function, and thus there is a point at which the costs of organizing an extra transaction within the firm are equal to costs of the same transaction in the market. The decrease in returns may be due to the failure of an entrepreneur in placing factors of production, or in wasting resources. (Coase 1937) Inventions which lessen spatial distribution, or enhance managerial techniques, tend to increase firm size (Coase 1937). But once it becomes economical to have a market transaction, it also pays to divide production in such a way that the cost of organizing an extra transaction in each firm is the same (Coase 1937). While trying to answer the question of optimal firm size, researchers are trying to answer the question of how networked a business is. Transaction cost economics also provides explanations for the motivation to form business relationships. Transaction costs have been divided into following classes: (1) search costs (2) contracting costs (3) monitoring costs, and (4) enforcement costs (Dyer 1997). Networking is a way to decrease these costs.

The dimensions describing transactions are (1) uncertainty, (2) frequency, (3) durable, transaction specific investments required to realize least cost supply (Williamson 1981). Williamson listed that bounded rationality, opportunistic behaviour, uncertainty, and small numbers are the source of market failure and the reason for hierarchy (Williamson 1975). Small numbers situation means there are only a few possible companies with whom it is possible to carry out certain transactions. Opportunism is self-interest seeking behaviour lacking candour. Opportunism does not pose a considerable risk as long as there are a large number of exchange relations to obtain. Large numbers for a given transaction may diminish as the contracting process proceeds, and when renewing a contract there is a

small-numbers situation. Short-term contracting is risky if there is opportunism and small numbers combined. (Williamson 1975) The reason for the loss of large numbers is that companies adapt to each other and learn in the process, and thus a relationship becomes more difficult to change. Small numbers gives space to opportunism, in large numbers competition between bidders will render opportunistic inclinations ineffectual. (Williamson 1975) Actually, the condition of large numbers is always imperfect in real world, because firms are heterogeneous (Williamson 1975).

Bounded rationality causes problems in uncertain or complex situations (Williamson 1975). Williamson suggests that the limitedness of human language is a source of bounded rationality, because it does not allow the transmission of tacit knowledge (Williamson 1975). Inside a firm, it is easier to transmit tacit knowledge, and internal organization also allows more uncertainty and complexity, because the threat of opportunism is smaller (Williamson 1975). Internalization of operations also allows an efficient adaptation between parties (Williamson 1975). Internalization of vertical operations is favoured where uncertainty and bounded rationality exist and a small-numbers condition would otherwise prevail, either due to the outset or because of a "lock-in" situation (Williamson 1975).

In TCT markets and hierarchies are exclusive for transactions (Williamson 1975). If a strategic network is considered to be a semi-hierarchy, it will not fit into the framework of transactional economics. Transaction cost theory fails when explaining the increasingly co-operative behavior of companies and an increase in the coordination by market force (Göthlich & Wenzek 2005). In TCT, the specialization in a network is assumed to increase the transaction costs because of the increased possibility of opportunism. When firms specialize, they have to protect against opportunism e.g. by using more complex governance structures, like contracts, that increase contracting costs (Dyer 1997). Reducing information asymmetry reduces the potential for opportunism, and thus also transaction costs (Dyer 1997). Contractual commitments also bring in governance inseparability, which implies that the existing contracts constrain strategic flexibility and the potential to commit to new partners (Argyres & Liebeskind 1999). Traditional TCT does not consider the interconnectedness of the commitments of a company, but rather it focuses on individual firms (Argyres & Liebeskind 1999).

2.3.2 Resource-based view

Resource-based view (RBV) is one of the approaches explaining competitive advantage arising from firm-level efficiency advantages and entrepreneurial rents on them (Teece et al. 1997). The basic thoughts of resources-based view were presented in a paper by Wernerfelt in 1984, but the ideas are older backing to Penrose (1959). Wernerfelt proposed that resource-based approach will lead to new insights on firms, especially in diversified firms. These insights will allow for the identification of resources, which can lead to high profits (set resource position barriers). Firm strategy involves finding a balance between existing resources and future needs (resource-product matrix), and an acquisition can be seen as a purchase of resources in a far from imperfect market

(Wernerfelt 1984). Difficulties arise because investigating resources is difficult before acquisition (Wernerfelt 1984).

Resource based view emerged to complement traditional economic theories and challenge their assumptions. Until that time major theories in economics had assumed that firms within an industry are identical in terms of their strategically relevant resources and strategies. Another assumption has been that resources are highly mobile, and thus if heterogeneity emerges it vanishes quickly. (Barney 1991) Barney assumed in his model that firms are heterogeneous in resources and that those resources are not perfectly mobile, and this is a source of sustained competitive advantage. Barney considers resources to include everything that enables a firm to implement strategies that improve its performance, e.g. assets, capabilities, processes, information, and knowledge. (Barney 1991)

Firm resources can be defined as those tangible and intangible assets, which are tied semipermanently to the firm (Wernerfelt 1984). If production of a resource, or one of its critical inputs, is controlled by a monopolistic group, it will diminish the returns which the users of that resource can gain (Wernerfelt 1984). Also if a resource allows only the production of products, which have to be sold on a monopsonistic market, a firm is worse off than if it could sell in other markets as well (Wernerfelt 1984). Theoretical conditions which underlie competitive advantage are resource heterogeneity, ex post limits to competition, imperfect resource mobility and ex ante limits to competition (Peteraf 1993). Firms of varying capabilities are able to compete in the marketplace, and firms with superior resources will earn rents (Peteraf 1993). Isolating mechanics, like property rights, lags, information asymmetries, frictions, causal ambiguity, producer learning, buyer switching costs, reputation, buyer search cost, channel crowding and economies of scale, protect resources from imitation (Peteraf 1993).

Barney claims that a firm implementing a value creating strategy not implemented by any competitor is enjoying a competitive advantage. A competitive advantage is sustained, if other firms are unable to duplicate the benefits of that strategy. (Barney 1991) A beneficiary strategy which is not possible to duplicate may be based on a resource, which is valuable, rare, imperfectly imitable, and not substitutable (Barney 1991). Imperfect imitability may be due to one or more of the following three reasons: a resource is dependent upon unique historical conditions, the link between resource and the resulting competitive advantage is causally ambiguous, or the resource is socially complex (Barney 1991). Causal ambiguity means that even the firm possesses a competitive advantage it does not understand the link between its resource and the competitive advantage it is derived from. Barney assumes that if the firm possessing the resource understands that link, other firms can also understand the link and acquire necessary resources, and thus the company loses its competitive advantage. (Barney 1991)

RBV brought internal resources back into consideration at the beginning of 1990's when the strategy debate had been concentrating on external factors as a source of competitive advantage for a few decades (Lockett & Thompson 2001). By this time RBV also began to look outside a company's boundary for the reasons of competitive advantage since research on business networks increased its significance and visibility. Specialization

causes borders between companies become ambiguous, and firms should also consider the resources they access through the network (Brito & Roseira 2007). By definition, networking is, in most instances, the method entrepreneurs use to access external resources, necessary in the pursuit of opportunities (Jarillo 1988).

2.3.3 Knowledge-based view

The knowledge-based view (KBV) of a firm has emerged from two different sources: the knowledge-based view has partly emerged from RBV and researchers have recognized knowledge as the resource that brings the most sustainable competitive advantage. KBV has also partly emerged from more evolutionary paths (Foss 1996). These evolutionary paths refer to thinking such as studies on organizational learning, managerial cognition and the management of technology (Grant 1996). Due to its various origins, KBV is sometimes called by different names, like the competence-based perspective (Krogh & Roos 1995).

KBV is not a fully-fledged theory yet (Grant 1996). However, it differs from institutional theories in its interpretation what a firm is. KBV claims that a firm is not only a bundle of contracts, but more importantly a repository of knowledge (Foss 1996). That knowledge is the critical input of production and is a primary source of value for the firm (Grant 1996, Kandampully 2002). KBV explains that firms exist because they are able to create conditions for individuals to integrate their specialist knowledge, and these conditions are not found in a market (Grant 1996). Market-based contracting would not form relationships that would be long-lasting enough or block opportunism (Grant 1996). KBV is not, however, a special case of TCT, because it is a framework allowing team production instead of managed transactions (Grant 1996).

KBV offers a rival explanation for the existence of firms for opportunism (Kogut & Zander 1993). It is not a failure of markets that drives the formation of firms, but the superior efficiency of firms in the creation and transfer of knowledge (Kogut & Zander 1993). Thus opportunism is not needed as an explanation: the cost of transferring knowledge is a sufficient reason since cooperation inside a firm leads to capabilities that are easier to transfer within a firm than across firm borders (Kogut & Zander 1993). Throwing opportunism away from explanations has been criticized e.g. by Foss, who claims that contracting gives employees the incentive to work for a social community that allows the accumulation of social knowledge, and also makes highly specialized assets combinatory (Foss 1996).

Since KBV defines firm borders by the high costs of knowledge transfer, it also discusses the attributes of knowledge extensively. The most basic typology of knowledge is a division to information and know-how (e.g. Kogut & Zander 1992). Kogut and Zander (1993) define the knowledge attributes that influence the decision of an efficient firm boundary as; codifiability, complexity and teachability. Another common division is between tacit knowledge and explicit knowledge (Nonaka & Takeuchi 1995). These two types of knowledge differ in their transferability across firm borders but also inside a firm. Explicit knowledge can be revealed by communication, but tacit knowledge is revealed

through its application (Grant 1996). Explicit knowledge is thus easy to transfer and it quickly becomes public property, but tacit knowledge instead is slow, costly and uncertain to transfer (Grant 1996). Krogh and Roos (1995) divide knowledge to subjective knowledge, which is possessed by a single individual, and social knowledge.

It is quite obvious in this point, KBV recognizes the knowledge called tacit knowledge, know-how, or competence as a source of competitive advantage instead of easily transferred explicit knowledge. Krogh and Roos (1995) claim that competence is critical for firm performance since it is difficult to imitate and thus provides the best basis for development of competence advantage. However, tacit knowledge must be applied to receive returns equal to its value (Grant 1996). Due to the nature of tacit knowledge KBV has an emphasis on individuals as a relevant unit of analysis for competitive advantage (Krogh & Roos 1995). Sveiby (2001) claims people to be "the only true agents in the business". Thus strategy formulation in knowledge-based organizations should begin with intangible resources, the competence of people (Sveiby 2001). Grant (1996) defines knowledge creation to be an individual activity, whereas a firm should apply the existing knowledge to the production of goods and services.

KBV's emphasis on tacit knowledge and its significance has led to studying creation and the transfer of tacit knowledge. Tacit knowledge has to be moved from an individual level, where it is created, to social level for application. According to KBV, a firm's primary task is to integrate the specialized knowledge of individuals (Grant 1996). Individual knowledge must be socialized before it can be integrated. A way to develop knowledge to the social level is by objectivating, namely interpreting it into language, signs, tools or marks (Krogh & Roos 1995, Grant 1996). Objectivating allows the development of knowledge into organizational stories or develop them into procedures, theories or paradigms (Krogh & Roos 1995, Grant 1996). The whole process of objectivating and integrating knowledge is facilitated by a shared stock of technical and organizational knowledge (Kogut & Zander 1992). Organizational capabilities, which according to Grant (1996) are linked to competitive advantage, are a result of knowledge integration and may result from individual knowledge or the mechanisms that an organization utilizes to integrate that knowledge.

A firm internalizes an activity of knowledge production if outsourcing that activity would be difficult because of the limits of communication or the very high information costs of outsourcing (Foss 1996). The more tacit knowledge is the more difficult it is to transfer across organizational boundaries. Firms are the best form of organization for transferring knowledge that is difficult to codify. It is also possible that companies are not willing to transfer tacit knowledge across organizational boundaries because that knowledge is very resistant to imitation and may bring a competitive advantage in the future. (Kogut & Zander 1993)

Knowledge transfer differs from tangible goods transfer in several ways, and one of them is that tangible goods lose value when used, whereas knowledge increases when it is used and loses value if not used (Sveiby 2001). Knowledge transfer is a misleading expression, as both parties learn in knowledge transactions (Sveiby 2001). The knowledge-based view explains the need for interfirm alliances as a place for knowledge transfer (Grant 1996).

Trading knowledge often requires the establishment of long-term relationships, and suppliers and buyers share a collaboration code (Kogut & Zander 1992). Companies may decrease the cost of knowledge transfer by codification of knowledge, if that is possible. However, codification also increases the possibility of imitation of that knowledge (Kogut & Zander 1992). Knowledge goods differ from tangible goods because the firms do not face make or buy decision in a similar way: A knowledge-based firm may form new assets from its existing knowledge base, and its knowledge products also have to be considered from the point of view of future market developments and as an integral piece of existing knowledge (Kogut & Zander 1992).

Intangible goods are created and transferred in value networks (Sveiby 2001). A firm's knowledge base is not limited to the knowledge inside firm boundaries, but it also includes the knowledge of other actors in the network and the procedures that allow access to that knowledge and conduct collaboration (Kogut & Zander 1992). Intangible goods such as information and knowledge are produced and traded especially in the service sector. Knowledge-intensive services combine the knowledge arising from different sources and distributing knowledge, and thus are in an important role when researching processes of knowledge creation and utilization. (Hipp & Grupp 2005)

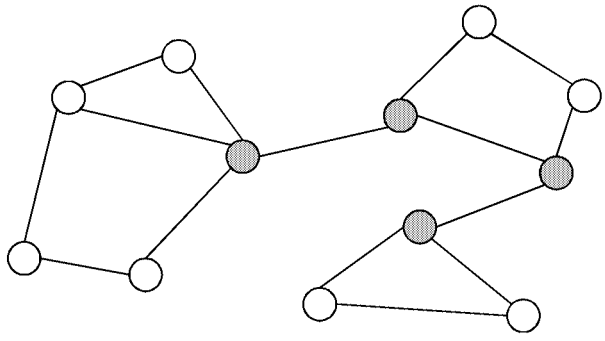
2.3.4 Social capital view

Competitive advantage has also been explained as derivative of a company's network position. Real-world networks tend to be clustered with single ties linking clusters to each other. Companies in the position of being the only link between two clusters are said to have a structural hole in their network or to be in a bridge position. A bridge is defined to be line in a network which provides the only path between two groups (Granovetter 1973). In the real world, the bridging function may be served locally even though it is unlikely that there are global bridges in a large network.

The competitive advantage derived from a network position is called social capital. Capital can be described as an investment with expected returns. Social capital differs from other forms of capital (financial or human) as it is both a collective and individual good. (Lin 2001) Social capital is jointly owned by the parties in a relationship, and it dissolves if either party leaves (Burt 1992). There are two perspectives on social capital: the level on which the return or profit is realized may be understood to be either individual or group (Lin 2001). At a group level social capital is an aggregation of the valued resources of the members of a network or networks. However, if social capital is discussed as a collective or public good the concept of social capital is divorced from its origins (Lin 2001). If social capital is also defined on group level, the concept may become vague and lose its content. At a group level it is possible to recognize following four ways on which embedded network resources can improve the operations of the network: 1) facilitate the flow of information and thus reduce transaction costs 2) exert influence on agents 3) provide social credentials and thus increase trust 4) reinforce identity and recognition. (Lin 2001)

Social capital as an individual good means that the individual is in a position within a network that allows it to gain returns. For example, in a business network a company may be, for historical reasons, in a position that proves to be valuable, or a company can develop new relationships to gain a valuable position. That position may be seen as valuable either because of the access to resources or because of the structure of the network (Burt 1992). The network as a source of competitive advantage due to the access to resources is related to resource-based view and transaction cost economics. A network structure as a source of competitive advantage is understood to be social capital. There are two network positions that have gained special attention in the literature of social capital: structural hole and closure. Structural hole and closure differ in terms of redundancy of their contacts. Nonredundant contacts are connected by a structural hole.

Figure 10. Structural hole and closure.



In Figure 10, a structural hole and closure positions are illustrated. There are two links that are only connections between clusters, (the links between grey units). Individuals that are parties in those connections are said to be structural holes, and they are in grey circles. Individuals represented by the white circles have no connections that are the only route to another individual. Thus they are considered to be in closures. Nonredundant contacts belonging to a structural hole provide network benefits that are additive rather than overlapping. (Burt 1992) Closure is a position, where contacts are redundant. The good side of closure is lower risk in what comes to trust and transactions, and thus the performance of the whole network can be improved (Burt 1992). Closure also has an advantage when preserving or maintaining network resources (Lin 2001). Structural holes instead offer the possibility of acting as a broker across holes and thus add value. They are also more purposeful when searching and obtaining resources. Empirical evidence suggests that a structural hole is generally a more valuable position than the closure (Burt 1992, Soda et al. 2004).

When interactions are of significant volume and substance a relationship is considered a strong tie. The level of importance may also be partly due to the investments done in the adaptation. Those relationships are difficult to substitute and the maintenance of strong bonds requires some kind of sacrifice (Håkansson & Snehota 1995). The importance of strong ties is easy to recognize. However, Granovetter (1973) emphasizes the importance of weak ties. He argues that weak ties maintain the structure of large networks, because they bridge clusters. He claims that no strong tie is a bridge (Granovetter 1973). The number and strength of ties is an important factor in the success of companies: A

company's risk of failure was the lowest when it had a mix of both strong and weak ties, and it was higher if either type of tie was dominant (Soda et al. 2004). Weak ties are important from the point of view of learning (Håkansson & Snehota 1995), because they provide special knowledge and competence. Thus, it may be that weak ties increase creativity up to a certain point and after that an increase in ties lessens creativity (Soda et al. 2004). However, Burt (1992) remarks that the strength of a tie is not important but rather the structural hole that the tie spans. Tie strength is a correlate but not a cause (Burt 1992). Loose couplings are effective in resource allocation in a complex and unpredictable environment (Håkansson & Snehota 1995) and they are cheaper to maintain than strong bonds.

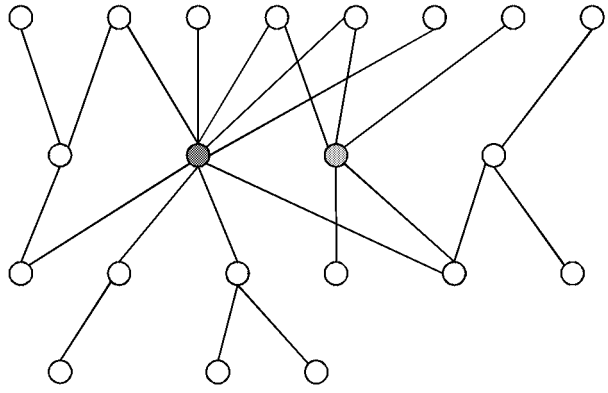
A study of structural holes offers an interesting explanation on competition claiming that it is a matter of relations, not player attributes. Competition is seen as happening due to the pursuit of benefits in relationships. (Burt 1992) Competition also takes place also in collaborative relationships, and is thus called co-opetition. Players form complex structures, where they trust some players and support some of them, and thus, are dependent on each other (Burt 1992). A structural hole position is seen as a potential broker position. Structural holes have decision power on what information is passed from one cluster to another, and control the projects that bring people together from opposite sides of the hole (Burt 2001). Information benefits take place in three forms: access, timing, and referrals. Structural holes are in a beneficiary position when negotiating, and e.g. in production networks producers in structural holes have higher profit margins. (Burt 1992) A structural hole position enables the access of information faster than the other companies because information from different clusters reaches it before other clusters. Structural holes also have the ability to control what information it passes along. This means it has a better negotiation position, because there is information asymmetry.

In real-world networks, competition is imperfect because no company can have a relationship with all potential business partners. Market situations can be seen as a closure, where companies can trust that that system gives a fair return on each investment. Because real-world networks are clustered with structural holes, companies have to choose whom to trust (Burt 1992). Closure is thus more efficient as a production system. Because companies cannot afford to use resources to form relationships with all companies, there is always room also for structural holes. If a structural hole is very valuable, it is likely that other companies will try to achieve the same position. This causes competition, makes the system more efficient and the former structural hole position less valuable, because there is now redundancy. A structural hole is called the small numbers situation in transaction cost theory (Burt 1992). Thus a structural hole position is valuable, and in all real-world networks there are *local* structural holes. Real-world networks are self-organizing (Barabasi 2002). Network structures are the result of evolution, their structure is not the result of a random process, and thus the structure does not represent a random network, but scale-free, where some nodes are significantly richer with links than are others (Barabasi 2002).

Natural networks are scale-free for different reasons. In some networks the winner takes it all, in some of them, the rich get richer all the time, thus there are many highly-linked nodes which do not lose their position (Barabasi 2002). Economics are considered to be

such a complex network, where companies are nodes linked by economic bounds, and others are more highly-linked than the others (Figure 11). The same structure is seen when studying ecological networks, like biological ecosystems. In ecological network the connections can be e.g. predator-prey connections, and the networks are also scale-free (Solé & Montoya 2001).

Figure 11. A real-world network such as a biological ecosystem or a business network.



In biological ecosystems the removal of a highly-linked keystone species causes an ecosystem to collapse due to cascading interference (Barabasi 2002). In economic networks certain companies are in a similar position as their removal would cascade through the network; that means they belong to the small minority that has collected the majority of links, as happens in scale-free networks (Figure 11). In a scale-free network there are a large number of companies that have a couple of relationships and only a few companies that have a high number of relationships.

Both structural hole and closure positions may provide a competitive advantage in a network. In a closure position a company can improve the functionality of the business network it is in by facilitating the flow of information and reducing transaction costs. It would also be possible to have greater influence on other agents. In a closure position there is higher level of trust, and a network can have an identity of its own. Because there are lower transaction costs and more trust, a closure position can be an efficient production system, and the whole network performs well. A closure is a large numbers situation, where all companies have a choice of several others with whom to do business. A company can also serve the bridging function locally, and it is likely to be a structural hole due to the high amount of linkages. That position would allow the brokerage of information. A structural hole can control which parties it brings together from either side of the hole. A broker company has better access to information because it gains it in different clusters. There are also better possibilities to react on time to global changes and reach new opportunities.

2.4 Sources of competitive advantage in a network

In a network context there are sources of competitive advantage that are alien to traditional economic theory (Dyer & Hatch 2006). Dyer & Hatch (2006) found out that companies can extract differing advantages from structurally equivalent networks, and that competitive advantage could not be explained by bargaining power. The difference was due to the specialization and adaptation and facilitated flow of information in the network (Dyer & Hatch 2006). The competitive advantage created was due to switching costs, access to resources and knowledge and relation-specific investments. Table 5 collects the perspectives on competitive advantage and the sources of competitive advantage they suggest.

Table 5. Competitive advantage in networks.

	Characteristics	Goals	Practices
TCT	Bounded rationality Opportunistic behavior Uncertainty Small numbers	Increase trust Reduce opportunism	Facilitate flow of information Avoid small numbers
RBV		Access Productivity gains New markets New products Efficiency Economies of scale	Specialization Adaptation Relation-specific investments Standardization Information asymmetries Governance structures Producer learning Buyer switching cost Buyer search cost Reputation
KBV	Opportunism Cost of knowledge creation	Integrating knowledge Tacit knowledge Transferability of knowledge Resistance for imitation	Combinatory knowledge assets Knowledge creation Objectivating of knowledge Application of knowledge
SC	Structural hole	Broker Access to resources Search of resources Access to knowledge Innovation potential Access to new markets Negotiation power	Specialization Learning from weak ties Linking knowledge and customer bases Complex governance structures
	Closure	Reduce opportunism Trust Preserve and maintain resources Excert influence on agents	Providing social credentials Flow of information Reduce information asymmetry Reinforce identity and recognition

Resource-based view can be extended to include network resources, thus defining shared and non-shared resources for a firm (Lavie 2006). Network resources are the ones that a firm reaches through its alliance network (Lavie 2006). Traditional resource-based view concentrates only on the resources inside firm's boundary, neglecting the impact that external resources have on the firm performance (Lavie 2006). In a network context, there are important resources which a company has not direct control over, but only through relationships and networks (Baraldi et al 2007). Valuable resources are nontradable and imperfectly mobile, however they can be shared in business relationships and networks (Lavie 2006). The competitive advantage that a company can derive from networks can result from individual sources or a combination of them. As we see in Figures 12 and 13, sources of competitive advantage are overlapping and intertwined. This was also expected based on Table 4. Figures were drawn based on the findings in the literature about the interdependencies between sources of competitive advantage and transaction properties.

Social capital realizes its value when combined with the sources of competitive advantage found in enhanced resources or in lowering transaction costs. Social capital in a closure is often combined with the possibility of lower transaction costs, whereas in a structural hole position, it is easier to utilize the competitive advantage arising from resources. In a closure, an important source of social capital is trust. Trust is gained through the enhanced flow of information between members. Trust lowers transaction costs as it lessens the possibility of opportunism, which is one of the most basic sources of several types of transaction costs. In a closure position, a small numbers situation is less likely than in a network with structural holes. In a closure position information asymmetries are lower, and thus transaction costs are also lower.

A structural hole position may bring competitive advantage to a company by allowing brokering across holes and thus adding value. That position is found to be beneficial in negotiating. A structural hole position can be valuable since it provides access to resources. A structural hole position is important both when searching for new resources and when obtaining resources. Obtaining new information is easier in a broker position. A company that is a structural hole is assumed to have weak ties, since strong ties only form in a closure. Weak ties are found to be important for learning, and loose coupling is more effective in resources allocation. They are also cheaper to maintain, and thus a company with weak ties may have a larger network with same resource usage.

In Figure 12 is illustrated the sources of competitive advantage a networked company can enjoy based on RBV and broker-type social capital. A structural hole, which can also be called a broker position, is in a theory superior position in terms of access to resources and knowledge. That access enables a company to gain innovation potential as it has the best access to new markets, new products and the knowledge base of other companies. In a broker position a company truly enjoys the benefits of the specialization of companies, e.g. as it can act as a link between very different knowledge or customer bases. That allows innovation, since innovation arises from the combination of knowledge bases. Innovation brings new products to the market and also creates new markets for existing products.

Companies can create a competitive advantage by sharing knowledge assets with suppliers (Dyer & Hatch 2006). Competitive advantage is dependent on the level of customization of the product; becoming the stronger with more tailoring (Dyer & Hatch 2006). Efficiency is achieved and productivity increased through cooperative specialization among firms (Dyer 1997). Networking also has an effect on resource development both inside companies and between them (Ford et al. 2002). If companies entail their resources to a relationship and build relation-specific assets and relational governance mechanisms they are able to access each other's the knowledge resources and exploit the efficiencies of mutual specialization (Vainio 2005, Gimeno 2004). At the same time they risk a "hold-up" or "leakage" increase (Gimeno 2004). If companies have adapted to each other to such an extent that a partner is controlling a key resource, the partner has power over the relationship and even over the company (Bae & Gargiulo 2004). That brings in a risk of losing access to those resources. Companies try to diminish that risk by creating a "switching cost". This kind of loyalty creation is not limited to contractual means, like gain and risk sharing, but it includes also physical proximity, sharing or licensing intellectual property, and building up an interface for the customer. (Gulati & Kletter 2005) On the other hand an alliance with less specialization and adaptation entails less dependence and lower risk, and they are easier to reverse (Gimeno 2004).

As companies cooperate, they specialize and adapt to each other to enhance the productivity and efficiency of the whole (Dyer 1997). Adaptations are a way to solve problems and the adaptations always affect both parties (Håkansson & Snehota 1995). Adaptation is defined as the process whereby an organization fits itself to its environment. Adaptation generates structures of progressively higher performance. (Holland 1995). Håkansson and Snehota (1995) recognize adaptation (in business relationships) to exist when there are "some activities in a company which are the same for several counterparts and others that are adapted (differentiated and unique) with respect to a specific counterpart".

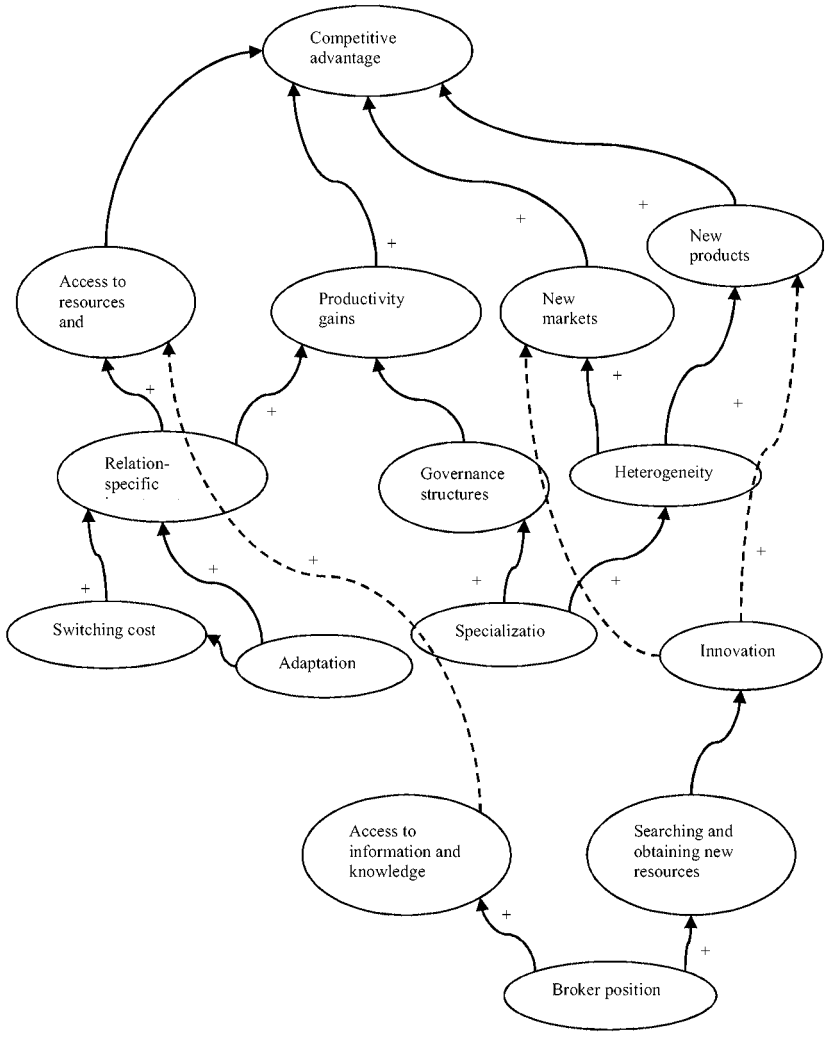
Creation of a business relationship typically requires some kind of adaptation from companies participating in it. That requirement for adaptation is not a negative consequence, because the reason why companies seek partners is the need to alter their own operation in some way. Adaptation in a relationship and co-specialization of alliance partners are two sides of the same coin: the same phenomenon from different perspectives. As companies form alliances or lesser co-operation structures, they may adapt their processes and structures to some extent to the corresponding entities of the co-operation party. This adaptation may also be visible in the products that the company manufactures. Allied parties cospecialize, and that specialization is an indicator of the intensity and irreversibility of partner dependence. This also brings the interdependence of relationships, because existing relationships define new relationships that are possible. Thus existing relationships and adaptations in them also form an intangible liability. Adaptation and alliance cospecialization take place in both horizontal and vertical alliances, and are also in both alliances where partners contribute similar resources and in alliances where they contribute different kinds of resources (Gimeno 2004).

Adaptations create a switching cost that indicates that they may partly cement a business relationship (Peteraf 1993). Adaptations are relation-specific investments, and before doing them, management has to consider if the duration of the transaction agreement/contract is sufficient to bring in a necessary return on investment (Dyer 1997). As Dyer puts it, productivity gains in the value chain are possible when firms are willing to make transaction or relation-specific investments. Investments in relation-specific assets are often correlated with superior performance, but they also create transaction costs because of the fear of opportunism. In general, as asset specificity increases, more complex governance structures are required to eliminate costly bargaining over profits from specialized assets. (Dyer 1997)

Committing to a technology other firms govern causes becoming a part of a network, independent other business activities (Kulmala & Uusi-Rauva 2005). However, multiple of that kind of commitments may facilitate agreement on the technical standards and thus enable more effective cooperation in some industries, e.g. telecommunications (Bae & Gargiulo 2004). Technological standards or common interest in developing a technology are also motives to join a partner web (Hoch et al. 1999 in Vainio 2005). Thus technology is a motive for partnering and a source of persistence in relationships. An interesting point is that voluntarism is found to be an important factor in a network. It is claimed that changes that reduce voluntarism are threats to the efficiency of a network (Miles and Snow 1992).

In networks companies may gain a competitive advantage by increased efficiency and productivity due to cooperative specialization. That requires building relation-specific assets and governance mechanisms. Production efficiencies and access to information and resources are part of specialization or companies in a network and an adaptation of companies to each other. Adaptation is a source of switching costs. Adaptation may cause a strong interdependence on resources outside company boundaries, and even a lock-in situation. Companies have to manage that risk, and that traces back to safeguards against opportunism.

Figure 12. Resource-related sources of competitive advantage.



The specialization of companies brings with it the risk of opportunism, and thus firms use more complex governance structures in specialized networks. For resource-based competitive advantage there are four conditions: resource heterogeneity, ex-post limits to competition, imperfect resource mobility and ex ante limits to competition. The traditional view is that resources controlled by monopolies diminish the returns of users of that resource. In a network companies are likely to increase governance structures to ensure their access to that resource.

In RBV a central theme is to protect the resources that give a competitive advantage from imitation. Of the recognized mechanisms of protection relevant in network context are information asymmetries, producer learning, buyer switching costs, reputation, buyer search costs and economies of scale. In a network context some of these mechanisms may change. Information asymmetries may be a source of competitive advantage for a broker, but in some cases reducing information asymmetries increases competitive advantage (Dyer & Hatch 2006).

According to extant literature in a closure it is possible to create competitive advantage which is based on resources and knowledge. That competitive advantage can be such that

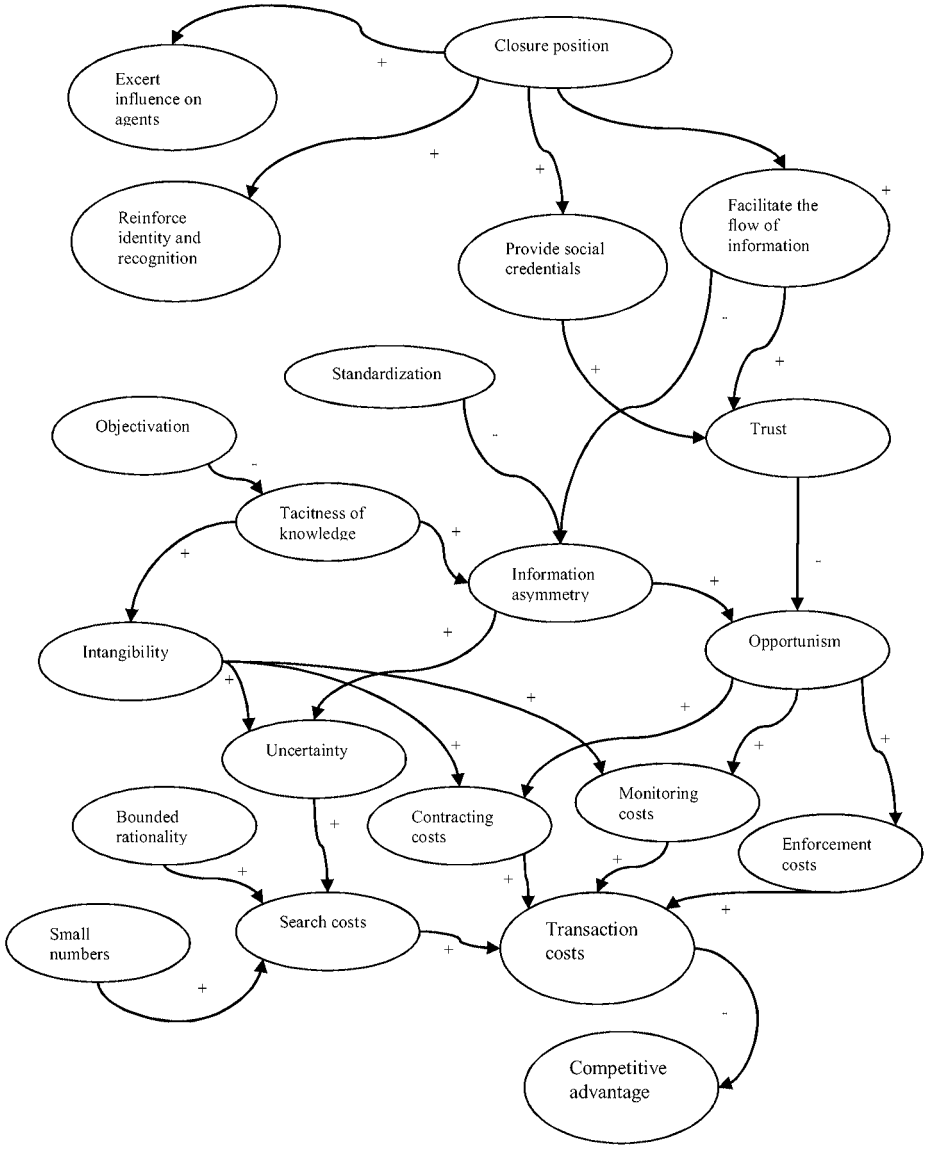
1) Companies specialize. That leads to productivity gains in network level.
2) Companies adapt to each other and create relation-specific investments. Allows productivity gains and enhanced access to knowledge and resources.
3) Companies use networks to search for and access new knowledge and resources. That leads to innovation.

In Figure 13 the sources of competitive advantage that are gained through closure and lowered transaction costs are presented. In closure the social capital created is always on a network or relationship level. Social capital in closure can be a means that facilitates the flow of information, which reduces transaction costs by reducing opportunism. In a closure it is also possible to exert influence on the agents, which allows a company to develop a network to directions it wants to pursue. Providing social credentials increases trust and thus can lower the risk of opportunism. Social capital also may be in the form of reinforced identity and recognition, which may allow a company to build a shared network strategy. Closure is a structure, which is seen to preserve and maintain network resources.

A company can gain competitive advantage by lowering transaction costs. Transaction costs arise from bounded rationality, opportunistic behaviour, uncertainty, and small numbers. A company can lower transaction costs by influencing these factors. Reducing opportunism by increasing a certain type of social capital is a way to decrease monitoring costs, contracting costs and enforcement costs. That can be for example by reducing information asymmetry and increasing trust.

Besides opportunism, the tacitness of knowledge is a factor increasing transaction costs. A company can aim at objectivating knowledge in order to lower information asymmetries and bounded rationality of other companies. Objectivation increases the risk of imitation, and thus there may be a link between tacitness and risk of opportunism, but it has not been discussed in literature

Figure 13. Transaction-cost related sources of competitive advantage.



According to extant literature in a closure it is possible to create competitive advantage which is based on lowering transaction costs. Transaction costs can be lowered by

4) Facilitating flow of knowledge. Builds trust.

5) Providing social credentials. Builds trust.

6) Objectivating knowledge. Decreases tacitness, lowers information asymmetries.

Table 6 brings together the sources of competitive advantage, which were recognized with the theoretical bases. Table 6 features the explanations and assumptions that each theory brings to that source of competitive advantage.

Table 6. Sources of competitive advantage in nework and their theoretical basis.

Source of competitive advantage	TCT	RBV	KBV	SC
Companies specialize	Decreasing returns to the entrepreneur function as firm size increases. Inventions lessening spatial distribution or enhancing managerial techniques tend to increase firm size. Uncertainty, frequency, durable transaction specific investments required to realize least cost supply.	Firms are heterogeneous in their resources, which are not perfectly mobile and are tied semipermanently to the firm. Resources, which are valuable, rare, imperfectly imitable and not substitutable can bring competitive advantage.	Knowledge is the critical input in production and the primary source of value for the firm. The firm is able to create such conditions for the integration of knowledge that the market cannot create, because of opportunism or the cost of transferring knowledge. Tacit knowledge is critical for firm performance as it is difficult to imitate, provides a basis for competence advantage.	
Companies adapt to each other and create relation-specific investments	Adaptations are a way to lower transaction costs in a certain relationship.		Need for interfirm alliances as a place for knowledge transfer. Trading knowledge requires the establishment of long-term relationships, and suppliers and buyers to share a collaboration code.	Closure is of lower risk what comes to trust and transactions, thus the performance on the whole can be better. A closure can be an efficient production system. A closure is a large numbers situation, a structural hole is a small numbers situation. Loose couplings are effective in resource allocation, cheaper to maintain than strong bonds.
Companies use network to search and access new knowledge and resources	Limitedness of human language is a source of bounded rationality, does not allow transmission of tacit knowledge.	Isolating mechanisms, like property rights, lags, information asymmetries, frictions, causal ambiguity, producer learning, buyer switching costs, reputation, buyer search costs, channel crowding and economies of scale protect resources from imitation.	Explicit knowledge is easy to transfer and quickly becomes public property, but tacit knowledge is slow, costly and uncertain to transfer.	A broker across a structural hole can decide on what knowledge to pass, has better access to information and special knowledge from different clusters, and is in a better position for searching and obtaining resources. Empirical evidence: a structural hole is generally a more valuable position than closure, as it allows learning through

				weak ties. In closure there are lower transaction costs to reach knowledge and resources.
Facilitating flow of knowledge	Bounded rationality, opportunistic behavior, and uncertainty cause transaction costs. These can be reduced by building trust.	Resource heterogeneity, ex post limits to competition, imperfect resource mobility and ex ante limits to competition.		At group level embedded network re-sources can improve the operations in the network by facilitating the flow of information and thus reduce transaction costs.
Providing social credentials				Companies can in a closure provide social credentials to lower transaction costs. In a closure there is higher level of trust, and a network can have its own identity.
Objectivating knowledge	Tacitness causes bounded rationality and increases transaction costs. Firms are a place for creating tacit knowledge.		Explicit knowledge is easy to transfer and imitate, tacit knowledge is slow, costly and uncertain to transfer and difficult to imitate. Tacit knowledge is protected as it is a potential source of competitive advantage.	

In table 6 the assumptions presented on different theoretical bases are also empirically tested. However the potential sources of competitive advantage suggested here combine theoretical bases in a new context, and has therefore not been tested if the sources of competitive advantage in a network obey the assumptions presented here.

3 NETWORK STRATEGIES

> "Network strategies move beyond the dyadic concerns of the quality of particular partners as firms pursuing such strategies are also attentive to relational advantages – for example the affect a new tie will have on its ability to access and broker timely information among its existing partners." (Rowley & Baum 2008)

The strategic view of networks is contributing to a lacking area of network literature, the management of networks. In this chapter the main network strategies found in the literature are assessed based on the sources of competitive advantage they are utilizing. The differences in the assumptions of different models are also discussed.

3.1 Strategic network

Transaction cost economics has been applied to business networks, which are based on cooperative behaviour (Jarillo 1988). Networks have been said to be between markets and hierarchies, which are the forms of organization transaction economics recognize (Jarillo 1988). Jarillo (1988) considers a network to be a strategic network, which is used to gain a competitive advantage over other firms. Strategic network differs from a classic market so that it is not a zero-sum game (Jarillo 1988). In a strategic network, there is a hub firm, which has relationships with the other members of the network. Those relationships are long-term, contracts are relatively unspecified, and tasks unstructured. Due to those characteristics, there is certain asset specificity in relationships, and relationships are like investments (Jarillo 1988).

A strategic network allows its members to have flexible commitments to non-essential activities (Jarillo 1988). Jarillo (1988, p. 35) claims that the market is still applicable, because "[N]o matter how close the relationship between buyers and sellers, no matter how long it has endured, if better trading terms (considering quality, quantity, timing and price) can be obtained elsewhere, there is no permanent tie to stop either party making alternative arrangements". That ignores the small numbers situations, which is present, if a company has been sourcing from one supplier for a long time. However Jarillo (1988) presents safeguards against opportunism in a network.

In a strategic network the lack of trust is the basic level source of transactional costs (Jarillo 1988). Trust is generated by carefully choosing partners, showing that an entrepreneur would be worse off if they behaved opportunistically, emphasizing long-lasting relationships, and not exporting all risks to subcontractors (Jarillo 1988). If a firm is able to outsource non-core activities to most efficient suppliers, keep the activities it has got comparative advantage in, and lower transaction costs when doing that, a superior type of organization has emerged, a strategic network (Jarillo 1988). The remaining

question is if a strategic network has really lowered transaction costs, if the adaptations it has made in it are a form of transaction costs. It is more like a making a large investment rather than paying a lower, constant fee all the time.

Dyer (1997) partly answers the question: Transaction costs do not necessary increase with relation-specific investments. Basically, when making an investment in relations, the fear of opportunism increases. This leads to complex governance structures required to safeguard from opportunism, which increases transaction costs (Dyer 1997). Transaction-specific investments specialize resources and lower their value in alternative uses (Dyer 1997). However, sharing information reduces the potential for opportunism by reducing information asymmetry between actors and reducing opportunism reduces transaction costs (Dyer 1997). The credibility of behaving cooperatively increases as actors demonstrate a commitment to future interactions, increase the amount of information sharing, and employ self-enforcing safeguards (Dyer 1997). This kind of trustworthiness results in enhanced performance in the cooperation (Dyer 1997).

In a strategic network competitive advantage is created through two main sources: Lowering transaction costs and creating social capital. The social capital created aims at creating trust. Trust is gained through information sharing and thus social capital is on a group level, in the form of a closure. Trust lowers transaction costs since it diminishes the chance of opportunism. Opportunism is also avoided by safeguards. In a minor role in strategic networks is the competitive advantage gained through resources. However, strategic network aims at productivity gains through specialization and relation-specific investments. In strategic networks, resources are considered mostly static, and innovation and new product development plays a lesser role.

- In a strategic network, the following sources of competitive advantage are pursued:
- Companies specialize. That leads to productivity gains in network level.
- Companies adapt to each other and create relation-specific investments. Allows productivity gains and enhanced access to knowledge and resources.
- Facilitates the flow of knowledge. Builds trust.
- Objectivating knowledge. Decreases tacitness, lowers information asymmetries.

3.2 Strategic business nets

Möller et al. (2005) see that there are four network levels to which management should pay attention. Those levels are 1) industries as macro networks, 2) strategic nets, 3) net and relationship portfolios and 4) strategic relationships, which is an extensive discussion on its own and thus not discussed further in this dissertation. The strategic net level is of the most interest for this study. A firm's strategic behavior in networks can be analyzed

through the positions and roles they play in focal nets (Möller & Halinen 1999). Business nets are "intentionally formed networks that contain a finite set of parties, at least three" (Möller et al. 2005). There may be several functions that a net can be constructed to aim at, and different nets require different competences and characteristics to be successful. If a net is an existing value system, the goal is to increase functional efficiency (Möller et al. 2005).

The crucial issues in managing business nets are how to mobilize value-producing nets and what the favourable positions and roles are in different strategic situations (Möller et al. 2003). At a strategic network level there are three main strategies firms may implement depending on the properties of the respective network: (i) improving the operational efficiency of a strategic net, which is a strategy for stable value systems, (ii) improving the leverage of existing capabilities through participating in one or several nets and, a strategy for established networks, and (iii) developing new capabilities through innovation nets, for emerging networks (Möller et al. 2005). On an industry level, networks of large companies may have enough power to affect the goals and behavior of macro networks or even industries (Möller et al. 2005). In general, stable value systems tend to be hierarchical and have a hub firm; in less specified and more dynamic systems the network structure is looser. Different types of business nets require different types of capabilities. In stable value systems (i), increasing efficiency is the core issue. In the incremental improvement systems (ii) it is essential to create trust that allows to carry out joint venture projects. When creating new business concepts (iii) companies are asked to have orchestrating capabilities and have visioning ability. (Möller et al. 2005)

Net-management capability is a firm's capability to mobilize and coordinate the resources and activities of other actors in the network. (Möller & Halinen 1999) Coordination may be embodied in the information and management systems that enable companies to coordinate their business inside the network. In innovation networks companies share privileged organization knowledge, and thus trust is required between companies and net-management capability is present in a competence to evaluate these capabilities and the innovation capability in its partner candidates. (Möller et al. 2005) Network visioning capability in creating valid views of networks and their potential evolution is an essential property of a hub firm that that wants to have net-management capability (Möller & Halinen 1999).

For a stable value system (i) a hub company has to have competence and traction to form a tightly coordinated supply net. That requires certain connections to customers and a central position in the field. The stronger a position a company has, the better bargaining power it has over other players. In partner organizations the desired properties are efficient and flexible production systems, processes that are easy to integrate into activities in the net. The information and management systems role is to combine business processes to allow for efficient production. When increasing the leverage of existing capabilities (ii), in central roles are trustful relationships that allow joint R&D development. When developing new capabilities and concepts, knowledge management in terms of explication and a combination of tacit knowledge and the sharing of knowledge plays an important role. (Möller et al. 2003)

The third significant level is a net and relationship-portfolio level (Möller & Halinen 1999). The upper level question of strategic networks is broken into two subquestions: 1) in which nets to operate, and how to coordinate one's net positions 2) how to coordinate the actor relationships in a particular strategic net (Möller et al. 2005). Efficient maintenance of relationship portfolios refers to the development and maintenance of customer relationships in a way that ensures the long-term profitability of the firm. Portfolio managing capability consists of competencies in creating and using databases and conducting supplier and customer evaluation, and the capability to develop organizational solutions for handling exchange relationships. (Möller & Halinen 1999).

Depending on the network type strategic business nets approach suggests different sources of competitive advantage. Competitive advantage may arise either from social capital, where a firm acts as a broker over several networks, and thus is in a structural hole position. In that position a firm has access to new resources, markets and products. Another potential source of competitive advantage is resources, where building governance structures allows a firm to enjoy productivity gains. The third potential source is creating social capital in a form of closure, creating trust to diminish the chance of opportunism. By blocking opportunism firms allow the inter-firm creation of new knowledge and innovations.

In a business net, the following sources of competitive advantage are pursued:

- Facilitating flow of knowledge. Builds trust.
- Companies specialize. Leads to productivity gains in network level.
- Companies adapt to each other and create relation-specific investments. Allows productivity gains and enhanced access to knowledge and resources.
- Companies use networks to search and access new knowledge and resources. This leads to innovation.

3.3 Business ecosystem

The idea of comprehending economy as an ecosystem dates back to concept of industrial ecosystem (Frosch & Gallopoulos 1989). Rothschild (1990) named his ecosystem-inspired view of economics bionomics. Rothschild found the biological analogy useful as the key phenomena in economics and nature are similar. Competition, specialization, co-operation, exploitation, learning and growth processes take place in both systems, even though economic change is very rapid compared to nature. In this perspective in the central position in economics is technology, not human beings. The success of companies is defined on the basis of their technology and relationships to other companies (Rothschild 1990)

The business ecosystem as a concept was introduced by James F. Moore (1993). Business ecosystem is an organisation group crossing many industries working cooperatively and

competitively in production, customer service and innovation (Moore 1993). The key contributors to business ecosystems are leading companies that have a strong influence over the co-evolutionary processes, but decision-making is decentralized (Moore 1996). Business ecosystem concept was inspired from complex adaptive systems theory, like co-evolution. Business ecosystems may collapse in a way that is similar to how natural ecosystems react to changes in environmental conditions (Moore 1996). Crucial for ecosystem survival is keystone of the business ecosystem. In a biological ecosystem that means a species that is crucial for the productivity and balance of the ecosystem (Moore 1996). Business ecosystem has been also defined as a network of companies each occupying a place on its own landscape of possibilities, and each landscape being coupled with many others: those of competitors, collaborators, and complementors (Lewin & Regine 1999). When the landscape of a company changes the landscapes of other members of the business ecosystem also change due to interconnectedness. Companies in complex environments, where co-opetition is present, should base their strategy on co-evolution (Lewin & Regine 1999).

A business ecosystem possesses certain core capabilities which are brought together to produce the core product (Moore 1996). Moore lays a strong emphasis on the life cycle of a business ecosystem. A biological ecosystem, like a business ecosystem, gradually moves from a collection of elements to a structured community. After the birth stage, a business ecosystem reaches an expansion stage that measures the potential of the core product and business concept. The leadership stage is a time of stability and high profits, but it is unavoidably followed by a self-renewal or death stage. (Moore 1993) During the stage one, entrepreneurs focus on defining what customers want. Winners during the births stage are those who best define and implement the customer value proposition. At this stage it pays to cooperate to get a complete product to offer to customers. (Moore 1993) In the second stage, ecosystems need to find new markets and territories. In this stage ecosystems begin to compete against each other, and in the end of this stage competition between ecosystems stabilizes. In stage three, ecosystems need constant innovation to keep up with the competition, and they compete over sources of innovation. In stage four, emerging ecosystems take over the previous ones if they are not capable of renewing themselves. (Moore 1993)

There are three critical success factors to a business ecosystem. First, productivity is a very basic factor which, at some point, will define the success of any kind of business. Second, any business ecosystem should be robust. The robustness of a natural ecosystem means capabilities of surviving when shocks from inside or outside the ecosystem threaten to destroy it. In business robustness means drawing competitive advantage from many sources and having the ability to transform when the environment changes. Third, a business ecosystem should have the ability to create niches and opportunities for new firms. This requires a change in attitudes from protectionist to co-operative. There are also four different roles that organizations can take in business ecosystems. The keystones are the kind of companies which serve as the enablers and which have a great impact on the whole system. However, they constitute a small number of the overall system. Niche players, on the other hand, make up the largest mass of the business ecosystem. Dominators and hub landlords are the kind of organisations which attract resources from the system but do not function reciprocally. (Iansiti and Levien 2004)

A keystone company is a company, or a business unit of a company, which is implementing a strategy characterized by following properties:

- The company is developing new ways of doing business by
    - Transformation of business through changing information transfer
    - Development of technology promoting standard interfaces that help with doing business
    - Development of physical, intellectual, or financial assets
- The company is in hub position
- The company is not absorbing all critical assets to itself, it represents only a small part of overall business of network
- The company manages external resources, shapes the structure of the external network, and maintains and harnesses external health
- A firm may be keystone in one area and not in others. (Iansiti & Levien 2004)

Any highly-linked company providing a platform is not a keystone company. There are also two "failure" strategies for a company that is in a central position in a business ecosystem and companies executing these strategies are called a dominator and a landlord. A dominator fails to create opportunities for other companies, it does not enable niche creation but performs all operations itself (Iansiti & Levien 2004). A landlord creates niches, but extracts too substantial amount value from the network, and thus making it become unstable (Iansiti & Levien 2004).

The action modes of keystones in biology are also seen in keystone companies of business life, but they are not present in the Industrial Organization view (Göthlich and Wenzek 2005). These action modes are 1) defeating of dominants and competitors, 2) mutualism, i.e. the direct support of niche players and 3) system enabling, i.e. enabling energy flows or the exchange between community members (Göthlich & Wenzek 2005). The main differentiator between a keystone company strategy and more traditional approaches is the recognition of a strong dependence between a company and the networks it is in. A single company cannot thrive for a long time, if the companies with which it is interdependent with are not doing well. Keystone company strategy brings in the active development of common resources in a network.

A keystone company provides a platform, on which other companies can build their operations (Iansiti and Levien 2004). That platform may be a technical platform, on which other companies build their own applications, or it may be a way of doing business, a distribution channel, or anything that enables other companies to do business. A platform is a set of solutions to problems, and it is also a method of value sharing (Iansiti & Levien 2004). According to Iansiti and Levien, platform, and shared processes and assets with other ecosystem members are the important components of keystone strategy, and a keystone loses if other companies abandon its platform (Iansiti & Levien 2004). Iansiti

and Levien (2004) see a platform consisting of two components, implementation and interface. Interface is a standardized way to access the implementation of a platform.

A platform is a concept that can be understood in various ways. It is relevant to remember that there are technological platforms and business platforms. In the business context, a platform is also defined in terms of technology (technological component embedding in the system), a collection of subsystems for the development of derivative products, integration of capabilities from organizations, and platform organization (Wonglimpiyarat 2004). As a collection of subsystems a platform can be e.g. a set of product components connected to form a subassembly that are common to various final models (Muffatto 1999). As an integrator of capabilities from organizations a platform is understood as a networking tool (Wonglimpiyarat 2004).

Committing to a technology which other firms govern causes becoming a member of a network, wanted a firm it or not (Kulmala & Uusi-Rauva 2005). Multiple of that kind of commitments may facilitate an agreement on the technical standards and thus enable more effective cooperation in some industries, e.g. telecommunications (Bae & Gargiulo 2004). Technological standards or common interests in developing a technology are also motives to join a partner web (Hoch et al., 1999 in Vainio 2005). Thus technology is a motive for partnering and a source of persistence in relationships. An interesting point is that voluntarism is found to be an important factor in a network. It is claimed that the changes that reduce voluntarism are threats to the efficiency of a network (Miles and Snow 1992).

A reason for platform development is found in the willingness to boost the innovation process. Companies are realizing the potential of an open innovation on side of closed innovation. Chesbrough (2003) explains open innovation as taking place in interactions between companies while closed innovation takes place inside a company. In open innovation a company does not try to achieve all the resources needed for innovation inside the company, but utilizes inventions made elsewhere and lets other companies to take advantage of inventions that have been left underutilized. In open innovation, companies accept that venture capitalists and start-up companies have become an important part of their innovation environment. (Chesbrough 2003)

An open innovation process can have three basic forms: The outside-in process, the inside-out process and the coupled process. Coupled process differs from the two previous ones as there innovation activities do not take place inside firm boundaries. (Grotnes 2009) The outside-in process may contain involving customers in the innovation process or getting outside technology into the firm (Grotnes 2009). A company may offer e.g. a development platform for customers. This is especially common in the computer game industry as community sourcing, where the customers to produce ideas and develop new solutions with toolkits and design tools offered by a company (Viskari, Salmi & Torkkeli 2007). The inside-out process is about putting products and innovations developed inside firm to external use by e.g. licensing or giving away. The inside-out process happens with standardization, when a company wants as many companies as possible to adopt its technology. The coupled process takes place when companies innovate cooperatively. In the coupled process anticipatory standardization plays an enabler role for innovation, as companies may develop specifications together for technologies, services, systems and

architectures that do not yet exist but companies are interested in pursuing. The results of that standardization may be the so called innovation commons that are more efficient innovation bases than closed systems. The innovation commons can also be called platforms or open architectures. (Grotnes 2009)

Business ecosystem concept presents a change of the mindset of leaders from hierarchical organizations to complex evolving systems (Moore 1998). Business ecosystem lends conceptual frameworks from complexity science and biology: the idea is that both natural ecosystems and business networks are complex systems, and they are not stable but evolving (Moore 1998). Thus it is possible to recognize similar dynamics in both coevolution and feedback loops. Iansiti and Levien (2004, p. 8) argue for the use of a biological analogy by stating that both natural and business ecosystem "are characterized by a large number of loosely interconnected participants who depend on each other for their mutual effectiveness and survival" and their members have a shared fate. A shared fate means that an individual company prospers only when the whole ecosystem prospers. This interconnectedness implies that competition between business ecosystems becomes more important than competition between single companies (Moore 1998). The members of a business ecosystem have a shared fate, and thus investing in its business ecosystem helps a keystone company survive and succeed (Iansiti & Levien 2004). A business ecosystem model allows the simultaneous integration of a dominator-, niche- and collaborative strategies (keystone company strategy) in a single macro-framework (Göthlich & Wenzek 2005). The leader of a business ecosystem aims to exert leadership, not control over communities. Firms should focus on their core capabilities and reinvest profits in those capabilities and on future generations of offers. More importantly, firms should invest in support for the ecosystem itself through activities like evangelism and standard setting. It is a collaborative strategy, because firms should strategize based on other organizations resources. (Moore 1998).

In a business ecosystem the competitive advantage often is created through the platform. On one hand, a platform may be considered as a resource. That resource has been built for the use of a network and also provides an advantage to niche companies. Competitive advantage may also arise from the new capabilities that are acquired across the ecosystem. Wide access to new resources and knowledge brings a keystone company a higher innovation potential (Iansiti & Levien 2004). However, the platform itself is not a resource creating competitive advantage unless it is combined with the right type of social capital. A platform should be widely adopted to realize its potential. Thus a keystone should have a large number of links. Iansiti and Levien (2004) claim that to gain an advantage on a platform a company should act on N-sided markets, in other words it should be in a broker position.

In a business ecosystem, the following sources of competitive advantage are pursued:

- Objectivating knowledge. – Decreases tacitness, lowers information asymmetries.
- Standardization. – Reduces information asymmetries.
- Companies specialize. That leads to productivity gains at a network level.
- Companies use a network to search and access new knowledge and resources. That leads to innovation.

3.4 Network structure and strategy

In literature there are a variety of definitions of business networks: from hub-and-satellite networks to clan-like structures and Keiretsus, and from regional and temporary networks to virtual organizations (Göthlich & Wenzek 2005). The wide variety of definitions and typologies is found because not all business networks have similar characteristics. The views of different authors differ to some extent as to what comes with the structure and manageability of a business network. A business network can be viewed as a structure without any centre or boundaries and no single actor alone is able to maintain or change the structure of a network (Håkansson & Snehota 1995). However it has been claimed that a keystone company may preserve the overall structure of a business ecosystem in an unstable environment (Iansiti & Levien 2004). This maintenance of a business ecosystem structure is possible due to the platform, which interconnects different parties.

The existence of a centre in a business network is a multifaceted subject: Others (Håkansson & Snehota 1995) perceive that there is no centre, whereas others (Möller et al. 2003) recognize that a network may have a strong core, or they may be multi-cored and distributed, and some (Iansiti and Levien 2004) emphasis the importance of a strong core. However, implicitly one can also find references to the existence of multi-core networks in their work, because they suggest that a company may act as a keystone in one business ecosystem and as a niche, landlord or dominator in other business ecosystems. Managerial problems in these different kinds of networks vary. The identification of a keystone company depends on the definition of the borders of a certain ecosystem. A company may have different roles in the networks it participates (Möller et al. 2005). In a network, where there is one company with a strong influence on the network and other companies consider their position to be equal to the majority or weak, companies in a weak position may consider their input to the network as more significant than the benefit they gain (Kulmala & Uusi-Rauva 2005).

Another interesting feature from the point of the view of network structure, besides the existence of a core, is the boundary of a business network. Some authors (Håkansson & Snehota 1995) consider a business network to be boundary-less. This is a valid perspective, because it is very possible that all companies in the world are indirectly

interconnected. However, as an assumption it is not very helpful, because it indicates that it is not possible to study a group of companies as a meaningful whole. The members of a business ecosystem are defined by studying the interactions occurring between organizations, or by the sharing of tools or technological components (platforms) (Iansiti & Levien 2004). Those boundaries do not correspond to industry boundaries.

Jarillo (1988, p. 32) considers strategic networks, which are constructed around a strong hub company, to be "long-term, purposeful arrangements among distinct but related for-profit organizations that allow those firms in them to gain or sustain competitive advantage vis-à-vis their competitors outside the network". Networks can be defined from the point of view of a single hub company, but this view has also been criticized. Ford et al. (2002) claim that all network descriptions centred on a single company, or defined by company itself, are restricted and biased, providing an incomplete view of the world. A business network is also difficult to delimit, because there is no objective boundary, and a good definition depends on the purpose of the analysis (Ford et al. 2002).

There are four basic types of networks separated by the level of interdependency between network members (Pfohl & Buse 2000). This interdependence is called coupling strength. In tightly coupled networks, firms form together bureaucratic structures. Loosely coupled networks are between markets and hierarchies, maintaining the identity of each firm and still operating as a whole. Primary Contracting networks have a hierarchical form, where the Primary Contractor is on the top of the pyramid. Objectives may be set by the Primary Contractor, and they cascade downward to the supporting firms. (Johnston et al. 2006)

Networks have also been divided into stable and dynamic (Miles 1992). The stability of networks is a derivative from strength of coupling. Stable networks form around a large core firm and there is a limited amount of partners. Stable networks are assumed to exist in mature industries. Dynamic networks form as temporary alliances between a large number of potential partners. Dynamic networks are found in either low technology industries or in evolving high-tech industries. Miles recognizes certain risks in both network types. In stable networks there is a risk of overutilization of a supplier or distributor that makes it too dependent on the core firm. In dynamic networks Miles considers there to be a risk of narrowing the expertise of firms and a need for safeguards against opportunism. (Miles 1992)

Möller, Rajala and Svahn (2005) divide business networks where a company may operate in three types: 1) stable, well-defined value systems, 2) established value systems, where improvement is incremental and 3) emerging value systems that produce radical changes. Miles and Snow (1992) also divide networks into three classes that are stable, internal, and dynamic. In both classifications important characteristics are considered to be the stability of the structure and the innovation potential of the network. A possible division is the one that classifies networks into hierarchical networks with a leading company and into networks with equal partners (Valkokari et al. 2006).

IMP Group defines business networks as structures without a centre of gravity. Business networks consist of "complex interdependencies that affect investments in equipment and physical facilities, numbers of people involved and their contact nets, the knowledge of

individuals and organizations, and organizational routines". Business networks also tend to change in terms of the intensity of relationships, and they also might emerge or disappear. Connectedness causes changes to one part of network to cascade into other parts. (Håkansson & Snehota 1995) In social networks it has been common to characterize them on the basis of communication. That approach can also be used in business networks. (Johnston et al. 2006)

On the basis of previous divisions, it seems that there are at least three axes on which networks can be characterized. Firstly, a network may be weakly coupled or strongly coupled. Secondly, it may be hierarchical in form with a hub company on the top of the pyramid – or a network formed by equal partners. Thirdly, the links between companies may transfer, or even be the place for the creation of, either knowledge or information. In figure 14 the discussed network models are shown with the axes of knowledge creation/information transfer and no center of gravity / with a center of gravity.

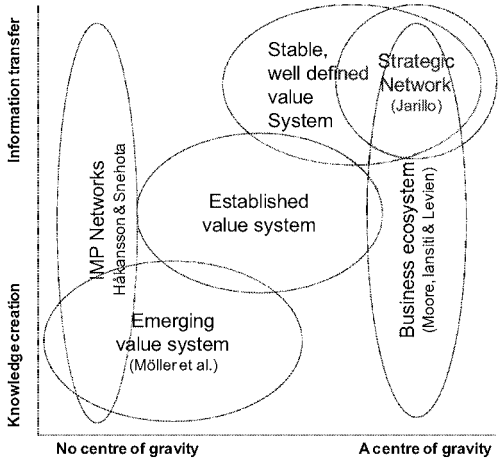


Figure 14. Information transfer / knowledge creation and centrality in different frameworks.

IMP group assumes that no network has a significant center of gravity. However, in IMP networks knowledge creation and information transfer aspects have both been recognized. Möller, Rajala and Svahn recognize that networks vary in the degree of centralization: there can be no centre of gravity, several centres of gravity or just one centre of gravity. The strategic networks and business ecosystem views concentrate on networks with a clear centre of gravity.

IMP networks and business ecosystems take into consideration both networks with knowledge creation and information transfer. Möller, Rajala and Svahn recognize three types of networks, and they differ in the type of knowledge/information they transfer. Emerging value systems concentrate on knowledge creation, whereas stable systems emphasize information transfer. A strategic network concentrates on information transfer between companies rather than on creating new knowledge.

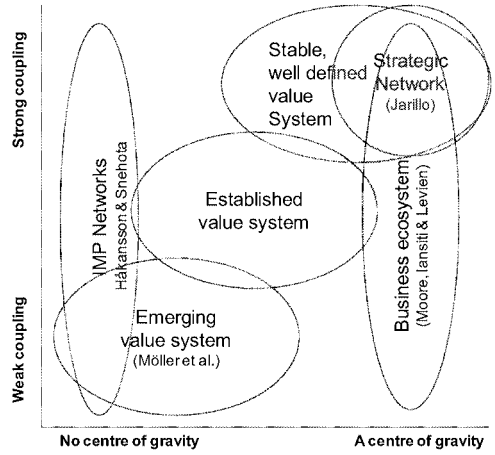


Figure 15. Centrality and coupling strength of a network in different frameworks.

In Figure 15, there are two axes of characteristics of a network presented: coupling strength and centrality of a network. The IMP group and the business ecosystem cover networks with both a weak coupling and a strong coupling. A strategic network assumes a strong coupling, as it is necessary for trust creation. Möller, Rajala and Svahn define three types: coupling is on its weakest in emerging value systems and strongest in the stable systems. As we see, in the models observed, there are actually only two axes in network characteristics: Knowledge creation and weak coupling take place in the same types of networks, and information transfer and strong coupling correlate. This is may be because weak ties are those that bridge previously separate clusters. Thus weak ties give a company access to new information. A strong tie is one that takes place inside a cluster.

Building a network using a strategic network framework sets the company in a hub position in the network. Thus that strategy fits hierarchical networks. Relationships have been described to be long term, and thus the coupling tends to be strong. To build up a strategic network a company must transfer both information and knowledge in its relationships. There must be trust built in the network to allow for flexible action, and trust is built by knowledge transfer. Since a strategic network should retain some kind of market to maintain its efficiency, the questions of coupling strength and knowledge transfer are crucial for a company choosing that strategy. The strategic business nets view acknowledges a variety of types of networks. In stable value systems there are hierarchical structures and strong coupling, but for dynamic systems the structure is looser and consists of equal partners. In stable systems efficiency is improved by improving the transfer of information, and that can be done for example by developing information systems. However, in innovation networks you have to transfer information and knowledge to create trust between parties. IMP group view avoids the simplistic view of hierarchical networks with a hub company, and actually does not suggest any specific strategies but rather some theses. Networks are assumed to be more like a network of equal partners rather than a hierarchical structure. An important aspect of networking is that it is the only real way to transform the business a firm is in. A change is made through convincing other companies and managing their expectations, that means building trust and sharing knowledge. Coupling may be either loose or strong. In a business ecosystem a keystone company is described as being in a hub position, so that strategy should

definitely fit better to hierarchical networks than the ones with equal partners. A keystone company provides a platform for niche companies and tries to make them thrive as it is dependent on their success. However, the risk of keystone company strategy lies in the coupling strength required from the subordinate companies. If there is strong coupling in the network, a keystone strategy of the hub company might destroy the ability of subordinate companies to also maintain relationships with other business networks and thus they become too dependent on the hub company.

As illustrated above, different network frameworks fit into different networks. There has been several contributions on networks with a center of gravity and strong coupling, but there is still work to do in other areas. Business ecosystem as a concept can bring new understandings for operating in weakly coupled networks with a strong core. This kind of networks are met e.g. in the area of innovation networks. In table 7 four models of a network are presented: strategic network, industrial network approach, strategic business nets, and business ecosystem. An industrial network approach is taken into the table although it does not give any specific advice for strategizing in business networks, because an industrial network approach is behind a strategic business net model, and is a widely used perspective. Network frameworks have been compared in terms of the theoretical background from which they arise, do they assume centrality of a network, do they acknowledge a boundary of a network to exist, what do they consider to be the source of competitive advantage derived from a network, how do business networks emerge, what is their main thesis for managers, what kind of vision they offer to a niche company, and how do they provide advice to a hub company.

Arising from different theoretical backgrounds, different network frameworks represent diverse economic theories. The strategic network by Jarillo arises from transaction cost theory, representing neoclassical economics, whereas a business ecosystem derives from evolutionary economics. The assumed source of competitive advantage differs in frameworks. Since a strategic network aims at lower transaction costs by increased trust, IMP and Strategic business networks find the source of competitive advantage in resource development and efficiency. In a business ecosystem framework competitive advantage is pursued through enhanced innovation potential. Frameworks assuming a strong core company give a significant role to the hub company in developing and shaping the network. A business ecosystem states most clearly that for a hub company to succeed it is necessary to have a successful network around it. A business ecosystem as a framework also takes to furthest the advice on how to build up assets on network level to make it a beneficial place for a niche company.

Table 7. Comparison on frameworks.

	Strategic Network (Jarillo)	Industrial network approach (IMP)	Strategic business networks	Business ecosystem
Theoretical background	Transaction cost theory	(Social) network theory, RBV	RBV, INA	Complex adaptive systems, evolutionary economics
Centrality of network	One company has the role of central controller	Network has no hub	There may be hubs or a network of equal companies	Contains a highly-linked keystone company
Network boundary	A clear boundary	No clear boundary	A clear boundary	A clear boundary
Source of competitive advantage	Transaction costs are lowered because of increased trust, allows companies to concentrate on their core competences and to gain competitive edge on them	Resource development between companies, efficiency in network processes.	Specialization; on the other hand efficient production and access to resources.	Managing assets through network. Innovation by bringing resources together in new ways like altering information transfer, developing network assets or promoting standard interfaces.
Emergence of network	Hub company puts up network and takes a pro-active attitude in the care of it	No single company is able to put up a network but it is a result of interactions of several companies.	Networks are formed intentionally to answer a variety of business challenges.	Hub company shapes the network by altering the ways existing companies interact and cooperate in a network.
Main thesis	Strategic network is an organizational innovation, a new form of organization that captures new competitive advantages.	Role, development and performance of companies is explained by their networking process.	Successful acting in networks requires network management capability and network visioning capability from companies.	For a keystone company to succeed it is necessary to maintain a healthy ecosystem.
Advice to niche	A company chooses its place in a value chain and that shapes the company.	---	---	Niche companies are main innovators and value creators and they choose which platform to use.
Advice to hub company	Foster trust, internalize risks.	---	On industry and strategic network levels suggests hub companies can shape network.	Hub company is in a decisive position in business ecosystem development.
Social capital	Closure	Closure	Closure or structural hole	Structural hole

Table 8. Sources of competitive advantage in network strategy models.

	Strategic network	Strategic business nets	Business ecosystem
Companies specialize	X	X	X
Companies adapt to each other and create relation-specific investments	X	X	
Companies use network to search and access new knowledge		X	X
Facilitating flow of knowledge	X	X	
Providing social credentials			
Objectivating knowledge			X

Table 8 illustrates the differences and similarities in the extant models on network strategy. All models include a specialization of companies as a source of competitive advantage. Specialization is the core of collaborative strategies, as it allows for efficiency, competence development and economies of scale. A strategic network and strategic business nets are somewhat similar as they both recognize the competitive advantage gained by adaptation and facilitation of knowledge flows. Facilitation of knowledge flows is a means of lowering transaction costs in a closure, and is a way to build trust. A strategic business net also recognizes that a network can be used to access new knowledge and resources, and thus enhance innovation potential.

A business ecosystem distinguishes of the two other models in the sense that it does not emphasize advantages built in a closure. In the core of a business ecosystem there is a platform, on which companies build. The platform can be considered to be a collection of knowledge that is at least partially explicit and available for other companies in the network to use. Thus objectivating knowledge in a business ecosystem allows efficient production and robustness, as it decreases opportunism and transaction costs. The platform also allows companies to specialize, and it provides a standard solution for a certain business problem. That standard solution decreases the need for adaptations, and also lessens the need for trust. In a business ecosystem companies need not act in a closure, and gaining access to new knowledge and resources and thus innovating is an essential factor for competitive advantage.

4 KNOWLEDGE-INTENSIVE BUSINESS SERVICES

> "Complex KIBSs involve a complicated mixture of interfaces in that the performance of an individual KIBS is insufficient in defining the overall performance of the integrated KIBS system." (Murray et al. 2009)

The aim of this chapter is to build an integrated theoretical framework for the competitive advantage gained in a network of knowledge-intensive services. To achieve that goal the characteristics of relationships of KIBS companies are studied, and the dimensions underlying those characteristics are found through analyzing existing theoretical knowledge. Those dimensions are used to interpret individual special characteristics not as something that will appear in all knowledge-intensive business service relationships, but as a consequence of the general-level dimensions of KIBS transactions. Recognizing that kind of dimensions allows us to understand how KIBS transactions may change if level of a certain dimension changes, and derive assumptions about how competitive advantage is derived from a KIBS network is dependent on the dimensions. Also the sources of competitive advantage which are typical for companies providing KIBS are recognized in literature, as well as possible explanations for why those sources are the most common ones.

The dimensions of KIBS relationships are integrated into a discussion on the sources of competitive advantage gained from a network. This is done by analyzing how dimensions affect the competitive advantage that is gained from a network. Based on this analysis, I construct a matrix, which presents the assumed sources of competitive advantage for all combinations of dimensions. The matrix is used as a tool integrating a theoretical framework and interpreting its assumptions into empirical study.

4.1 Knowledge-intensive service types

Making products has become less profitable and today many companies have moved from goods production to services production (Davies 2004). Companies are all the time moving to downstream to produce services that offer high margins of revenue (Davies 2004).

Knowledge-intensive services include a wide array of services, and e.g. innovation capability and technology intensity vary significantly inside the sector. However, they have not been very well recognized. Services are regarded as a residual class, and their importance has not been understood Hauknes (2000). The boundary between services and manufacturing is not very clear, as manufacturing firms complete product offerings with services and services firms combine physical devices with services (Larsen 2001).

Complexity and market competitiveness drive companies that have been producing goods to also provide services (Gebauer 2007).

Service classes that are often interpreted to be KIBS are in NACE (2009) classification 69 (legal and accounting activities), 70.2 (management consultancy activities), 71 (architectural and engineering activities; technical testing and analysis), 72 (scientific research and development), 73 (advertising and market research) and 74 (other professional, scientific and technical activities). (Corrocher et al. 2008) Miles (2003) divides companies into traditional KIBS and science and technology based KIBS (S&T KIBS) according to their knowledge base. S&T KIBS are the ones where important knowledge is related to science and technology, whereas in traditional KIBS it is more social or institutional (Miles 2003). They can also be called t-KIBS and p-KIBS, t-KIBS being for example IT related services, engineering, and R&D consulting, and p-KIBS which includes business, management, and legal services (Corrocher et al. 2008). KIBS can also be divided to physical services, human services, and information services (Miles 1998). T-KIBS often provides services that are highly customized. There is a tendency for firms to provide customized services to be more innovative than firms that provide standardized services. T-KIBS also differs from p-KIBS in their innovation patterns. (Corrocher et al. 2008)

4.2 Characteristics of competitive advantage of KIBS providers

A company can pursue sources of competitive advantage either internally or externally, as a networked competitive advantage. Table 9 illustrates the sources of competitive advantage that are typical for KIBS providers by giving examples of internal or external sources of competitive advantage. The choice of pursuing either internal or external sources of competitive advantage is independent of the strategy a company chooses, for example differentiation or cost, but the strategy chosen has an effect on what kind of internal or external sources are pursued.

Table 9. Examples on sources of competitive advantage a company can pursue.

	Cost		Differentiation	
	Economies of scale	Economies of scope	Product differentiation	Market differentiation
Internal sources of competitive advantage	Development of scalable asset Knowledge-based assets	Internal platforms	R&D Innovation Enhanced knowledge creation processes	Building new customer relationships alone
Networked sources of competitive advantage	Using external resources for better resource allocation	Shared platforms Developing network resources	Access to new knowledge Access to complementary products and resources	Access to customers via other network members Combined service offerings with other network members

It is claimed that KIBS creates long-term commitments where trust is in an important element (Miles 2003). The benefits of trust are reduced transaction costs, increased information sharing, and a willingness to invest in a customer-supplier relationship. A customer can decrease costs in a multi-supplier network by increasing trust. (Laaksonen et al. 2009) A KIBS firm can increase its performance by adaptations to clients, which include client screening, client training, education, accommodation and socialization, which includes developing trust (Bettencourt et al. 2002). Management consulting is a type of KIBS that does not compete on quality or price, but on experience-based trust and network reputation (Glückler & Armbrüster 2003). In service quality, part of the quality is the loyalty of service provider, which in time turns into customer loyalty (Kandampully 1998). Trust reduces uncertainty and controls opportunistic behavior (Glückler & Armbrüster 2003).

The location of companies and the spatial proximity of firms are seen as a more significant factors for KIBS companies than for companies in general (Drejer & Vinding 2005, Bryson & Rusten 2005, Müller & Doloreux 2007). The significance of location is due to the tacit knowledge, on which the competitive advantage of KIBS relies, is not as movable as codified knowledge (Christensen & Drejer 2005). According to them, strategic alliances are the vehicle facilitating the exchange and recombination of knowledge-based assets. It is claimed that companies can create a competitive advantage through strategic networks if they reduce information asymmetries by creating transparency of competence and knowledge and by facilitating the sharing of knowledge (Evanschitzky et al. 2007, Bettencourt et al. 2002). Thus generation, combination, transfer, application and the storage of knowledge become key tasks for network management (Evanschitzky et al. 2007).

As previously discussed, it is typical for KIBS to have high transaction costs. These higher costs are due to

- Confidentiality of information
- Intangibility of product
- Co-production with clients
- Information asymmetries between supplier and buyer

Companies try to avoid these transaction costs by

- Creating transparency of competence and knowledge
- Facilitating knowledge sharing
- Lowering information acquisition costs

Information asymmetries make it difficult for a customer to search for service providers and compare service offerings. In co-productive relationships information asymmetry also works to the other direction, since customers have a significant amount of information and knowledge that is needed to produce a service.

Services is a labour-intensive sector. This causes that only few service products can gain economies of scale, and they are ones that depend on physical elements. In KIBS firms providing bespoke services is even more common than in other services. The level of standardization is low and companies differentiate in terms of markets and service offering. Cost-based strategies are not favoured. The more there is standardization, the more there is cost-based competition. This does not mean that KIBS firms are immune to costs, and KIBS are also sourced because that is a way to reduce labour costs. However costs are seldom the decisive factor in outsourcing KIBS and selecting the provider. KIBS firms form close supplier-client relationships because of the aforementioned reasons: high transaction costs and bespoke service products. Companies achieve efficiency in their relationships by adapting to clients. In a relationship there forms experience-based trust that allows knowledge-sharing and lowers transaction costs. In close relationships there is also the risk of resource-dependency and lock-in.

4.3 Characteristics of KIBS transactions

According to Murray et al. (2009) the reasons for sourcing KIBS are to reduce labour cost, get access to talent and enhance innovation capabilities. Innovation is seen as the most important strategic aspect in service companies (Larsen et al. 2007). Creating customer relationships have a positive impact on service responsiveness and innovativeness (Theoharakis et al. 2009).

For knowledge-based enterprises, the motivations for collaboration are: gaining access to knowledge as a resource, generating new knowledge, protecting existing assets by collaboration, blocking rivals and access to other networks (Reid et al. 2001). Collaboration may also lead to a dependency on other companies' resources depending on how important a resource is, if are there alternatives and the degree of discretion (Evanschitzky et al. 2007). A company sourcing KIBS should align its sourcing strategy with the attributes of the KIBS that is sourced. The attributes of service that should be considered are variability, inseparability, tacitness and innovativeness (Murray et al. 2009).

Service delivery of KIBS is complex, unstructured and highly customized (Bettencourt et al. 2002). For knowledge-intensive business service organizations close supplier-client relationships are critically important (Küpper 2001), and thus service companies tend to deepen customer relationships (Larsen et al. 2007). This importance is due to the fact that the products they sell are partially produced in those relationships. The knowledge possessed by a knowledge-intensive service firm is also partly learnt in client-supplier relationships. Miles (2003) claims that business services firms often have close and long-term relationships with their customers to allow the exchange of business related knowledge and information. According to Hauknes and Miles (1996) the closeness and long duration of relationships may lead to policies that prevent competition. Closeness also makes it difficult for the provider to alter its services as services production is not as autonomic as goods production (Tether & Hipp 2002).

In any relationships there is an amount of transactional uncertainty that leads to transaction costs. Transactional uncertainty in knowledge-intensive services comes from confidentiality of information, service-product intangibility, and co-production (Glückler & Armbrüster 2003). Information, asymmetries are especially significant for services because of the intangibility. It is difficult to examine a KIBS company's competence and experience, the client may not have enough skill to assess what kind of competence it requires, and the complex nature of services makes it difficult to specify the service delivered (Miles 2003).

KIBS and technical services are especially eager to adapt their service, and provide customized and bespoke services instead of standardized services (Tether & Hipp 2002). Services are often characterized to be non-standardized, but there is increasing pressure to standardize services to increase efficiency by lowering search costs. Standardization brings services closer to the product market and increases cost competition. The industrial revolution was essentially about the standardization of manufacturing (Tassey 2000). In manufacturing, standardization allowed economies of scale and made markets more efficient (Tassey 2000). Standardization also drives specialization (Tassey 2000).

Service firms differ from each other in how they are linked to innovation systems, as some of them are forerunners of innovation and some lag behind and are weakly linked to national innovation systems (Miles 1998). KIBS are often discussed in the context of innovation networks (see e.g. Müller & Zenker 2001; Koch & Strotmann 2006; Zhao et al. 2010). There are four ways in which KISA contribute to innovation. KISA may act as renewal services, routine services, compliance services and network services. Renewal services are closely linked to the innovation processes of recipient organizations. Routine services help recipient organizations to perform and improve existing systems. Compliance services are seldom related to innovation. Network services provide a platform for knowledge exchange and thus may enable innovation. (OECD 2006)

Knowledge-intensive service organizations are recognized as part of innovation networks, and are important nodes in them (Miles 1998). KIBS have developed from the support of other companies' innovation to an innovation leader (Tether & Hipp 2002). The role of KIBS is seen as a knowledge integrator and knowledge transferor who search for relevant information and take part in knowledge networks (Tether & Hipp 2002, Antonelli 2000). Miles (2003) claims that KIBSs, and especially technology-based T-KIBSs are the most active innovators in current economy. Service innovations are not as well recognized as manufacturing innovations, and due to their intangibility, service innovations are not as easy to protect by e.g. patents (Hipp & Grupp 2005).

The importance of KIBSs for innovation systems has been contradicted e.g. by Larsen (2000), who claims that knowledge-intensive business service organizations are not as important contributors to e.g. innovations in manufacturing firms, as is often proclaimed. Larsen claims that companies control information and deny access to strategic information, and thus the information that KIBSs transmit is trivial and not of importance for innovations (Larsen 2000, p. 153).

However, in KIBS there are two groups which are significant for information flows and support learning and adaptation that have been recognized: communication services and

business services (Miles 2003). Services also accelerate the adoption of new technologies, especially services with a strong knowledge or technology emphasis as they take part in wide business networks (Hauknes & Miles 1996).

4.4 Dimensions of KIBS transactions

Network strategy choice, which a company makes when deciding what sources of competitive advantage to pursue from a business network, is dependent on the characteristics of KIBS relationships. The characteristics of KIBS transactions are widely recognized. The characteristics are partly interconnected, and they are explained in this chapter as arising from certain dimensions that create them. Those dimensions define the sources of competitive advantage that can be gained from a certain KIBS network. The dimensions are fundamental to the characteristics of KIBS, and in this study they operate as tools for deriving the assumptions of competitive advantage gained in KIBS networks. In the following section I choose the dimensions used in this study, and explain how the chosen dimensions produce KIBS characteristics, which have been recognized in earlier studies.

Similar attempts to reduce special characteristics to a couple of dimensions are found in studies of Müller and Doloreux (2007), Rajala and Westerlund (2005) and Safizadeh, Field and Ritzman (2008). In this study the dimensions that are considered to essentially effect the competitive advantage derived from a business network of knowledge-intensive services are the tacitness of knowledge transferred in order to produce a service and the degree of standardization for the service provided. A lack of standardization is same as the particularization of a service for a certain customer. On the other hand, producing a knowledge-intensive service does not necessarily require an exchange of tacit knowledge, as tacit knowledge can also be embedded in the producer's processes or in personnel, and the service provided may pass only explicit information.

The degree of involvement in customer relationships and the level of homogeneity of offering are the two dimensions that cause a difference in business models of software firms and their use of KIS (Rajala & Westerlund 2005). A business model is an interpretation of firm strategy to day-to-day business, and thus the choice of business model reflects the networking strategy a firm implements. The degree of customization and the tacitness of knowledge are suggested to be defining factors for the make-or-buy decisions of KIBS (Safizadeh et al. 2008). Those dimensions are close to tacitness and standardization, as homogeneity and customization are basically the same thing. They are both dependent on the level of standardization. Involvement in a customer relationship is in this study interpreted to be dependent on the tacitness of knowledge created or transferred.

Müller and Doloreux (2007) discussed the role of KIBS in innovation systems, and they choose to study the relationships between the dimensions of knowledge, innovation and spatial proximity to better understand KIBS companies. Proximity is important because tacit knowledge transmits locally (Christensen and Drejer 2005). Tacit knowledge may be grounded in locations and people, and face-to-face interaction plays a significant role in

passing tacit knowledge (Christensen & Drejer 2005). Tacit knowledge, and access to it, is also more possible resource of sustained competitive advantage than easily transferring explicit knowledge (Christensen & Drejer 2005). Simple knowledge passes to close and to distant actors, but complex knowledge requires close relationships to transfer (Sorenson 2006). Complex knowledge was defined as knowledge that requires prior knowledge to be understood, the absorptive capacity, knowledge is causally ambiguous, or it has tacit components (Sorenson 2006). Also according to Müller and Doloreux (2007) close relationships are needed for transmission of tacit knowledge. Tacit knowledge plays a significant role for innovation potential (Toivonen 2004, Leiponen 2006). Customized services have been found to be more innovative than standard services (Tether & Hipp 2006), but the tailoring of services should not be interpreted to be a service innovation (Toivonen 2004).

Close relationships and a requirement for trust in KIBS derives from information asymmetries between KIBS providers and clients (Leiponen 2006). Information asymmetries are increased by unstructured products, and information asymmetries can be reduced by standardization (Blind & Hipp 2003). A lack of standardization prevents competition (Blind & Hipp 2003, Dinu & Tachiciu). Standardization leads to less close relationships and less adaptation is required (Tether et al. 2001).

Table 10. Relationships between KIBS transaction characteristics and dimensions of tacitness and non-standardization.

	Tacitness	Non-standardization
Complex		+
Unstructured		+
Particularized		+
Co-production	+	
Difficult to alter		+
Intangibility		
Information asymmetries	+	+
Localness	+	
Innovation potential	+	
Long-term relationships	+	+
Close relationships	+	+
Policies preventing competition		+

Table 10 presents the dependencies between characteristics of KIBS relationships and dimensions of service (tacitness of knowledge transmitted and lack of standardization), which have been found in literature and presented in chapters 4.2. and 4.3. In the following, an analysis concerning more particularly the effects of standardization and tacitness the characteristics presented in table 9 are discussed further and are linked to the concepts of TCT, RBV, KBV and social capital.

In figure 16 is the same configuration as figure 5 completed with the characteristics that are attached to KIBS relationships and the factors affecting them. The sources of competitive advantage presented in this figure are the ones that surfaced in the KIBS literature (see chapter 4.3) as sources of competitive advantage pursued in KIBS sourcing.

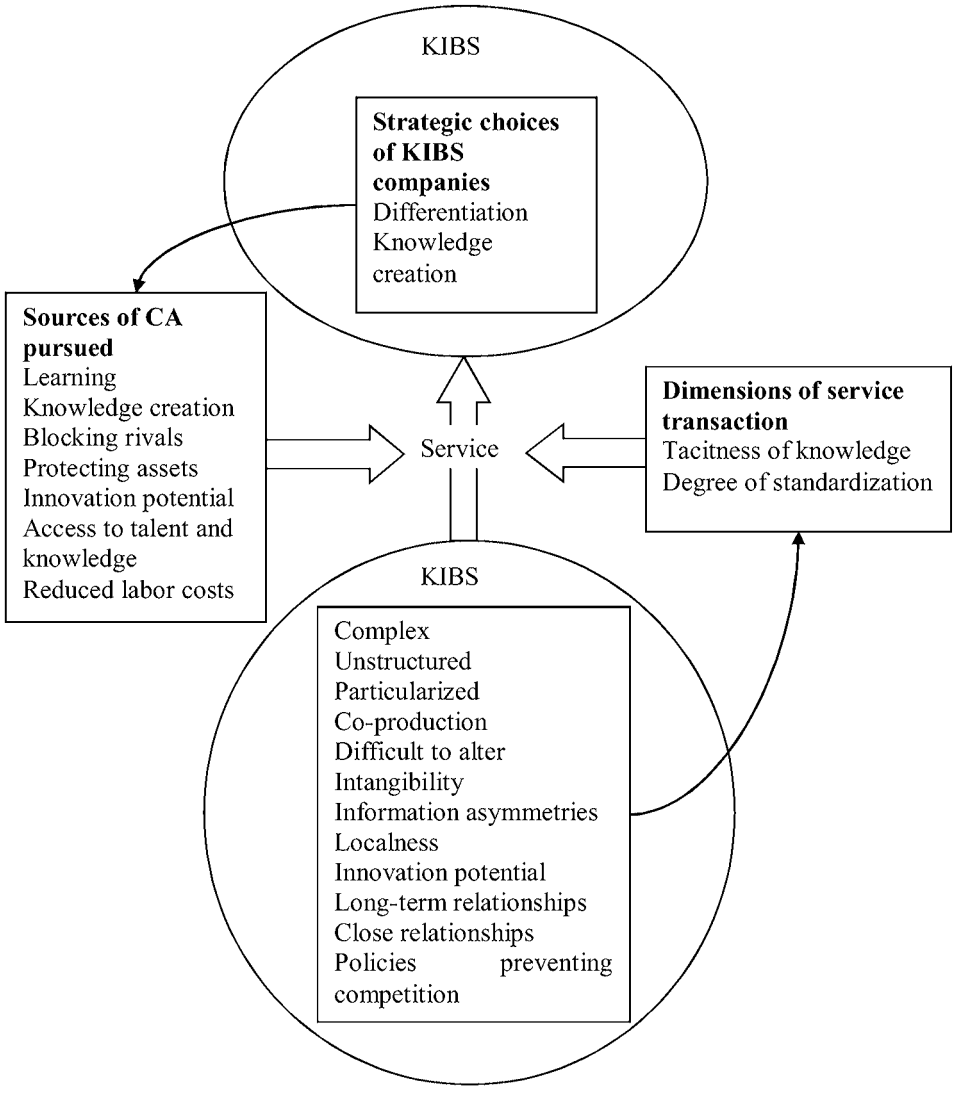


Figure 16. Characteristics of KIBS transactions and the underlying factors behind them.

Figure 16 presents the service transaction. The customer of a KIBS company tends to pursue differentiation strategy, and their competitive advantage is perceived as arising from knowledge. KIBS companies have been found to pursue learning, knowledge creation, blocking rivals, protecting assets, innovation potential, access to talent and knowledge and reduced labour costs. The benefits pursued are mostly related to resource- and knowledge-based competitive advantage. On the other hand the relationships of KIBS companies are characterized with complexity, unstructuredness, particularization, co-production, difficulty in alteration, intangibility, information asymmetries, localness, innovation potential, long-term relationships, close relationships and policies preventing competition. The characteristics of relationships are interpreted as being a result of the dimensions of KIBS transactions, which are degree of tacitness and level of standardization.

Standardization

Standardization is about the codification of technology or information that is relevant to the economic activity (Tassey 2000). A standard is "a construct that results from reasoned, collective choice and enables agreement on solutions of recurrent problems" (Tassey 2000). Dinu & Tachiciu (2008) explain service standardization to consist of a specification of requirements complied with e.g. company's resources, procedures and information. In product standardization, it is sufficient to define the characteristics of the end product, but in service standardization, the process that produces it plays a significant role (Dinu & Tachiciu 2008).

Standardization is an interesting issue in services, from the point of view of service providers standardization is a process that decreases general profits and is thus not welcomed (Dinu & Tachiciu 2008). However Wouters (2004) presents a customer adaptation strategy as infernal strategy for a business-to-business service provider, as it brings in less profit than offering standard services. Wouters's has a point assuming that standard services and adapted services are competing for the same customers and those customers are not willing to pay for the adaptation. Standard service and standardized service may also have different connotations, as standardization refers to an industry-level process, which aims at reducing information asymmetries between service providers and buyers, whereas standard service may mean any service that a company does not adapt from client to client. Service standardization would increase competitiveness, improve customer satisfaction and remove barriers of international trade. Standardization also facilitates the contracting and monitoring of service transactions. Information asymmetry keeps the service sector fragmented and partly protects service firms from competition and thus also hinders its development in terms of performance and the lowering of costs. Service sector development affects the development of whole economy. (Dinu & Tachiciu 2008)

A service sector, where standardization has played a significant role is the telecommunications industry (Grotnes 2009). Standardization has created specifications that are widely applied, and in the telecommunications industry standardizations enables open innovation as it promotes the compatibility of technologies (Grotnes 2009). Companies may either utilize the standards created by other or create new standards as a joint effort for example for future technologies, services, procedures, systems and architectures (Grotnes 2009). From the innovation perspective, standardization versus particularization has been seen as a significant factor, but it is still unclear how innovation and standardization are interdependent. Standardization and particularization are linked to the industry life cycle, but the views on how they are connected vary. In traditional life cycle models that have been inspired by goods production, the first phase has the greatest variety of outputs and least standardization, and has an emphasis on product innovation. When dominant design emerges variety decreases, standardization of output increases, and innovation focus moves to the process innovation. Competition becomes price-based, and fewer producers dominate the market. (Tether et al. 2001)

In service production there is interdependence between standardization and face of life cycle (Barras 1986). He emphasized the significance of the adoption of technological

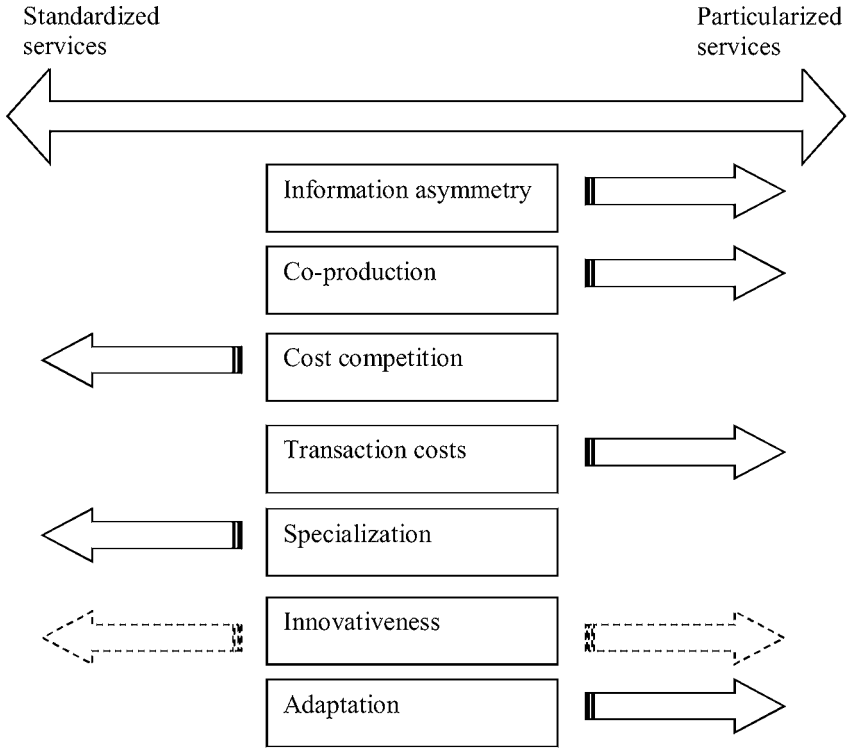
innovations in services. In the first phase, services adopt technologies developed elsewhere for their own use. In the first phase companies provide standardized services and aim at efficient production by process innovations. The second phase includes increased variety of service offering and competition moves from price-based to quality. In the last phase the focus is on product innovation and variety is at its highest, whereas standardization decreases over time. (Barras 1986)

Standardized outputs tend to be associated with large firms, and on average service firms are small compared to manufacturing firms. Company size has been an implication of service companies traditionally supplying local markets because they have required physical proximity. Developments in telecommunications have broken down that location dependence especially for standardized services. In services it is not clear that the emergence of a service standard would lead to a similar situation as in goods production where there are a few large providers that dominate the market. Company size does not affect whether a company provides standardized services. The industry companies are operating in has an effect, however, as in software, technical service and other financial services, where bespoke services are common, also firm size tends to be smaller than average. (Tether et al. 2001)

Standardized services are undifferentiated between customers, and particularized services are adapted to particular customer needs. There is a conceptual difference between variety and innovation. Innovation requires more than variety, especially if that variety is routine. Standardization is linked to high production volumes and to distant relations with customers. Standardized services tend to arise in price sensitive industries with economies of scale, routine production, high adaptation costs, inflexible technologies and relatively low-cost labor. (Tether et al. 2001)

The level of standardization of service provisions is a factor that affects what sources of competitive advantage a company can derive from its network. As a low level of standardization causes information asymmetries, it increases transaction uncertainty and thus transactional costs. A low level of standardization is also a reason for close supplier relationships, since the service that a company produces is defined for each relationship separately. In Figure 17 the effect of standardization and particularization are illustrated for each relationship characteristic that is linked to a level of standardization in KIBS literature, which was reviewed in previous parts of this chapter. Particularization promotes information asymmetries, co-production, transaction costs and adaptations. Standardization increases cost competition and specialization of companies. The effects of innovativeness are ambiguous, and on the other hand standardized services are claimed to be less innovative, but industry standards increase the innovativeness in general. In general standardization seems to allow increased cost efficiencies, and thus standardization can also lead to cost-based sources of competitive advantage in KIBS networks.

Figure 17. Effects of standardization dimension on KIBS transaction characteristics.

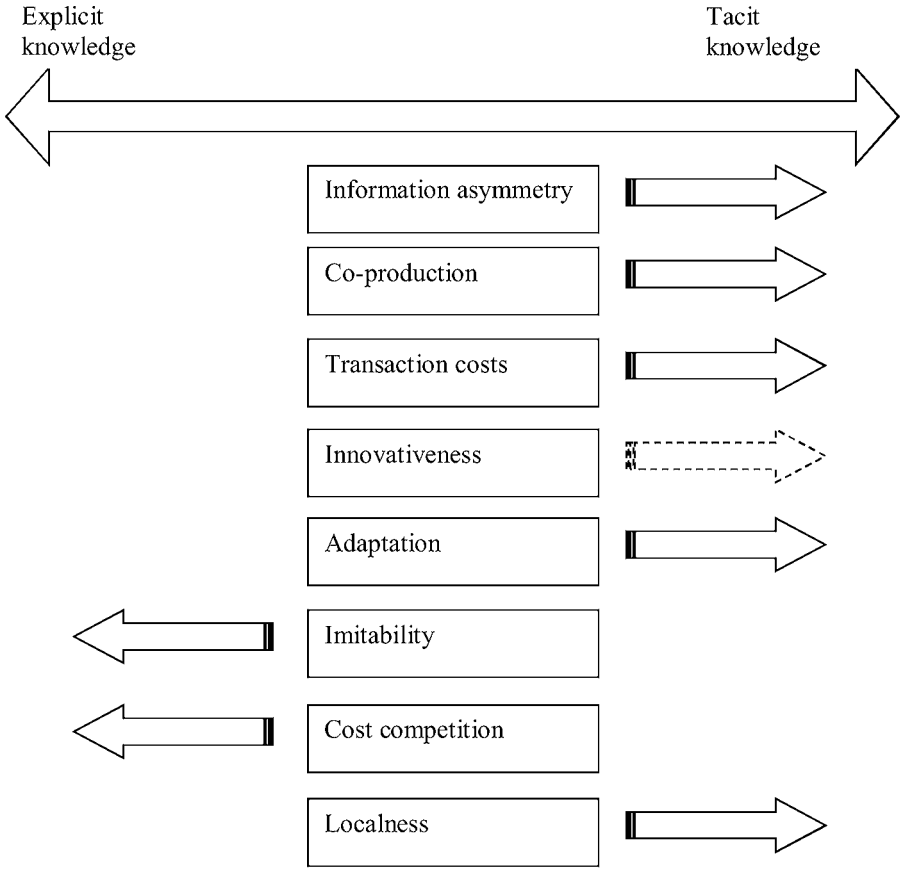


Tacitness

According to KBV, tacit and explicit knowledge differ in their transferability across firm borders. Explicit knowledge transfers easily and this is easily imitated. Tacit knowledge is slow, costly and uncertain to transfer. Tacit knowledge is a basis for the competitive advantage of knowledge-intensive service firms. Tacit knowledge can be objectivated to make it more explicit. Objectivating means translating tacit knowledge into language, signs, tools and marks. It is not possible to objectavate all knowledge, and companies may be unwilling to objectivate knowledge that might be a source of current or future competitive advantage and to make it prone to be imitated. Trading knowledge often requires long-term relationships and a shared collaboration code.

Since information asymmetries are a significant source of transaction costs for KIBS, a company can gain a competitive advantage by lowering information acquisition costs for clients and thus reducing information asymmetries. Information asymmetry also causes contracting, monitoring and enforcement costs. A service company can reduce information asymmetry by related diversification. Another way a company can lower search costs is establish a good reputation. (Nayyar 1990) The factors creating transaction costs in service transactions are asset specifity, metering and frequency of contracts (Miles 2003). Figure 18 illustrates the interdependence of KIBS relationship characters on the tacitness of knowledge. These interdependences are derived from the KIBS literature discussed earlier in this chapter.

Figure 18. Effects of tacitness dimension on KIBS transaction characteristics.



The interdependencies presented in figures 17 and 18 will be utilized in the next chapter as the effects of dimensions on the sources of competitive advantage are discussed.

5 COMPETITIVE ADVANTAGE IN KIBS NETWORK CONTEXT

> "It is proposed here that, on a macro level, the "resources" of the service organization can be attributed to three interrelated factors of modern business, namely: technology, knowledge and networks" (Kandampully 2002, p. 20).

As a conclusion on characteristics of knowledge-intensive companies, there are two dimensions that are the most defining for the competitive advantage a company is deriving from networks of knowledge-intensive services. The dimension that arises from the knowledge-intensity of a service is the level of tacitness of knowledge transferred across organizational boundaries in transactions. The dimension that arises from the nature of services is the level of standardization of the service. A service may be quite standardized, or it may be non-standardized and thus require adaptations in service production. Degree of customization is a factor underlying the intensity of client interaction, and the special nature of services is partly due to the low level of standardization of services (Leiponen 2000). In the following these sources of networked competitive advantage are discussed from the point of view of KIBS networks. This chapter integrates the analysis presented in chapters 4 and 5 into a two-by-two matrix, where dimensions are levels of tacitness and standardization. The matrix is built in order to define assumptions on sources of competitive advantage for four types of KIBS networks. The network strategies recognized in chapter 3 are discussed in the KIBS network context. The aim is to identify theoretical assumptions about the types of network strategies that companies choose in different types of KIBS networks.

5.1.1 Standardization

Effects of standardization on competitive advantage that is gained through access to resources/knowledge and creating network resources/creating knowledge

1) Companies specialize. This leads to productivity gains at the network level.

Standardization allows increased specialization because companies need less overlap of competence to be able to specify services and monitor them. On the other hand, standardization on the product market is linked to the emergence of dominant design, and variety decreases as a design and standard attached to it runs over others.

KIBS firms are prone to offer customized services instead of standardized services. There is a connection between the level of standardization and the innovation potential of a service provider: companies offering less standardized services are more innovative. Small firms tend to offer more customized services; large firms are more standardized in their service offerings. Average service firms are small compared to manufacturing firms.

Their small size is partly due to serving local markets. The more standardized services are, the more it is possible to utilize ICT to expand beyond local markets and to increase firm size.

2) Companies adapt to each other and create relation-specific investments. This allows productivity gains and enhanced access to knowledge and resources.

Low standardization causes information asymmetries and leads to close relationships, making adaptation necessary. It also increases the need for trust-building. The less standardization there is, the more companies are likely to adapt and build relation-specific investments. If services are standardized, adaptation is less beneficial, and thus standardization lessens the competitive advantage gained from adaptations.

3) Companies use networks to search and access new knowledge and resources. This leads to innovation.

Lack of standardization makes searching less efficient and increases the cost of acquiring new knowledge and resources. Standardization allows more efficient knowledge and resource acquisition, and standardized services are easier to compare to each other. Accessing standardized services is less costly since there is no need to adapt and build relation-specific resources. Innovation potential is increased because it is possible to attain information and knowledge outside closure and over structural holes, and combine knowledge without having much knowledge overlap.

Competitive advantage arises from earlier or more favorable access to resources or markets. Companies in a central position enjoy a competitive advantage, which may be due to such access. A structural hole also controls what information it passes from cluster to cluster. Information asymmetry gives companies negotiation power. Collaboration may give access to knowledge, be a place for generation of new knowledge, and protect existing assets. A company's knowledge base is not only what is inside the company, but also what knowledge can be reached via its network.

Innovation is claimed to be the most important strategic aspect for service companies. Innovation and creation of new knowledge are interlinked. Innovation arises from combining different knowledge sets (Feller et al. 2009). These knowledge sets are not always found inside a company's boundaries; open innovation has become increasingly common (Feller et al. 2009, Grotnes 2009). Finding the external knowledge needed may require reaching networks not previously known by the firm (Feller et al. 2009). Tacit knowledge has been found to be important for the innovation potential.

KIBS have been studied largely from the point of view of innovation, but mostly as agents of innovation systems and as contributors to innovation in other companies. Innovation in knowledge-intensive organizations is less examined. In this study innovation is considered as a special case of knowledge creation. In service innovations, customers are often seen to play a crucial part, and thus the business relations and knowledge transferred in them contribute to the development of new services or serving new markets.

Effects of standardization on competitive advantage that is gained through lowering transaction costs

4) Facilitating the flow of knowledge. This builds trust which leads to lower transaction costs.

In transactions where trust is very important, companies are likely to operate in a closure. In a closure it is possible to reduce transaction costs by facilitating the flow of information and by providing social credentials and thus increasing trust. A closure can be an effective production system, as internal transaction costs are low. In the real world companies cannot have relationships to all potential suppliers (and thus operate in a complete closure), there are always structural holes and companies have to choose whom to trust.

Service-product intangibility, confidentiality of information and co-production are sources of transactional uncertainty. For services, intangibility is a major source that is different from goods production: If the customer has less knowledge than the provider that causes increased monitoring and contracting costs since it is difficult to assess service quality and specify the service with lacking knowledge. Lack of standardization increases information asymmetries, and thus transactional uncertainty.

As KIBS are mostly of a low level of standardization, their delivery is complex, unstructured and highly customized. Services are produced in long-term relationships, and the customer may be a source of learning for the provider. This increases the importance of close supplier-client relationships. Lack of standardization prevents efficient competition since companies have difficulties with searching for collaborators, comparing them, or switching their collaborators.

Standardization works to reduce information asymmetries especially for clients. Information asymmetry in a business relationship is an interesting factor. From the point of view of resource-based sustained competitive advantage, information asymmetries are one of the isolating mechanisms that protect the source of competitive advantage from imitation. Information asymmetries also give a company in a broker position the opportunity to gain a competitive advantage. Information asymmetries bring advantages in negotiation and lead to higher profit margins for brokers. The broker also controls whether it wants to maintain that asymmetry. Information asymmetries are a cause of high contracting costs as information asymmetries increase the potential of opportunism.

Services face pressure to standardize in order to reduce information asymmetries. Standardization would make service markets more like goods markets and competition more efficient. The standardization of goods has led to increased economies of scale, but these are more difficult for services to gain due to their labour-intensity. Standardization would decrease particularization (adaptation to client) of services, but could increase specialization.

5) Providing social credentials. This builds trust.

Delivery performance in an individual relationship with a client can be increased through adaptation. Emphasis on trustfulness may lead to less cost-competition. Management

consulting is the type of KIBS that is not about quality or price but trust and network reputation. However there are studies saying that in some services neither price or trust are of importance, but other features play decisive role. In standardized services cost is an important factor of competition. In non-standardized services cost is not the decisive factor for the purchaser, even if outsourcing is partly done for cost savings, but cost competition and standardization go hand-in-hand.

6) Objectivating knowledge. This decreases tacitness and lowers information asymmetries.

A firm allows integrating specialist knowledge of individuals whereas a market cannot create such an environment. Since business relationships are between markets and hierarchies, they may be a place of creation of new knowledge. A factor affecting this creation is the cost of transferring knowledge. The more tacit knowledge is, the slower, costlier and more uncertain it is to transfer. Knowledge may be made less tacit by objectivating it. Objectivating is aided by shared technical and organisational knowledge. Thus companies may facilitate knowledge transfer between each other by creating shared language and tools and developing common procedures. This often requires a long-term relationship and a shared collaboration code. Objectivation increases the risk of imitation of that knowledge.

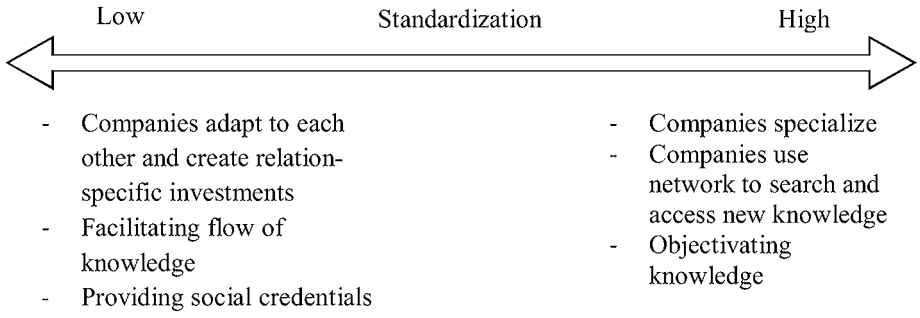


Figure 19. Effects of standardization on competitive advantage gained from network.

5.1.2 Tacitness

Effects of tacitness on competitive advantage that is gained through access to resources/knowledge and creating network resources/ creating knowledge

1) Companies specialize. That leads to productivity gains in network level.

Companies need to access external resources, and networking is the vehicle that provides this access. Access to external resources through networks is especially important in the situations where companies are very specialized and heterogeneous. Companies need each other's resources and knowledge to complete their own resource and knowledge bases. KIBS have often been seen as serving the knowledge transfer function between companies. Tacitness makes specialization more difficult, as companies need overlapping

knowledge bases to be able to collaborate. Networks transferring and creating tacit knowledge are less likely to enjoy productivity gains.

2) Companies adapt to each other and create relation-specific investments. This allows productivity gains and enhanced access to knowledge and resources.

Tacit knowledge and access to it is also more important for the competitive advantage than easily transferring explicit knowledge (Christensen & Drejer 2005). KIBS sourcing is done to gain access to resources and knowledge that enhances innovation capabilities. Explicit knowledge passes easily even to distant actors and through weak ties, but tacit knowledge requires close relationships. Passing tacit knowledge requires relation-specific investments, and that kind of investments can be useful and profitable, if they allow accessing or creation of valuable tacit knowledge.

3) Companies use network to search and access new knowledge and resources. This leads to innovation.

Central position in a network may allow a company to be in the nexus of innovation. Networks increase a company's potential to reach new markets and resources. The process of innovating may become faster and more efficient for those companies. A structural hole position should be the most useful for a company which wants to gain access to new markets, new products and knowledge of other companies. Several studies found that weak ties are important for learning and bring in special knowledge and competence; however tie weakness is not important, but weak ties often act as bridges and thus cause a company to occupy a structural hole position. Weak ties are cheaper to maintain than strong ties, and strong ties are often found only in closures. However it has been claimed that tacit knowledge cannot be transferred or created through weak ties.

Effects of tacitness on competitive advantage that is gained through transaction costs

4) Facilitating flow of knowledge. This builds trust which leads to lower transaction costs.

Tacitness of knowledge in transactions increases information asymmetries and thus increases transactional uncertainty. KIBS companies are claimed to create long-term trustful commitments in order to be able to deliver their services. Williamson (1975) also recognizes that bounded rationality caused by difficulties to transmit tacit knowledge is a factor affecting firm formation. Thus tacitness of knowledge is a core source of transaction costs besides the risk of opportunism. Tacitness increases information asymmetry, and thus it increases transaction costs. To gain advantages from lowering transaction costs companies can either objectivate knowledge or create relation-specific assets to allow transmitting and creating tacit knowledge, and long-term relationships to create trust. Facilitating flow of information is a way to enhance trust-building.

5) Providing social credentials. This builds trust.

Providing social credentials is important when tacitness hinders the lowering of transaction costs. As search costs are high, it is too expensive to evaluate all possible collaborators. Social credentials are used to find trustful collaborators without the need to go through them all.

6) Objectivating knowledge. – Decreases tacitness, lowers information asymmetries.

KBV states that tacitness is an important factor for firm formation and interorganizational relationships. Tacit knowledge is the source of a competitive advantage since it is not easy to transfer. Explicit knowledge transfers easily and is prone to imitation. Tacit knowledge is only revealed by its application not by its communication. Objectivating tacit knowledge may be difficult and costly, and it makes knowledge prone to imitation. In a situation where transactions contain tacit knowledge objectivation can make transactions less costly.

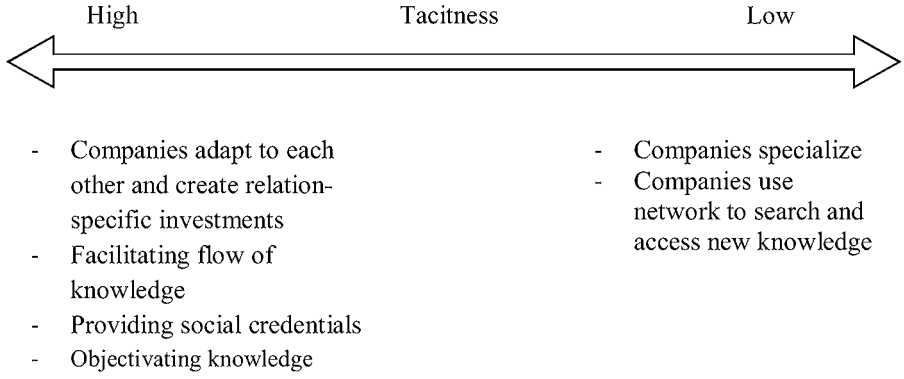


Figure 20. Effects of tacitness on competitive advantage gained from network.

5.2 Competitive advantage derived from KIBS networks

In the Figure 21 the dimensions of tacitness of transferred knowledge and level of standardization are used to form a division of four network types. The types are divided into four according to the level of tacitness of knowledge transferred in services, and the degree of standardization of services. For each type the assumptions arising from each dimension are drawn together. Some assumptions may be inherited from both dimensions (these are in bold). In the matrix I place the sources of competitive advantage assumed to be most attainable in each network type, and later I discuss how those sources are linked to network characteristics of each type.

Type 1 (Tacit knowledge, non-standardized) **Trust-building, social credentials** **Efficient production through adaptation** Knowledge created is of value for innovations	**Type 2** (Explicit knowledge, non-standardized) Providing social credentials Efficient production through adaptation Facilitating flow of knowledge
Type 3 (Tacit knowledge, standardized) Trust-building Specialization of firms Knowledge of value for innovations	**Type 4** (Explicit knowledge, standardized) **Efficient competition** **Specialization of firms, productivity gains on network level** Facilitated flow of knowledge, access to non-complementary knowledge

Figure 21. Potential effects of dimensions on competitive advantage in KIBS networks.

Further, assumptions were grouped to increase the understandability of the matrix. Assumptions were divided into three groups, which are named as follows: overcoming transactional uncertainty, network efficiency and access to new knowledge and resources.

Overcoming transactional uncertainty

Information asymmetries and tacitness of knowledge increase transactional uncertainty. Information asymmetries increase the potential of opportunism, and gives negotiation power for the party with more information. Information asymmetries also act as an isolating mechanism that protects the source of competitive advantage from imitation. Information asymmetries can also be on both sides, especially in co-productive relationships, as the customer may possess the knowledge and information needed. Information asymmetries can be reduced by creating trust. Trust can be built and opportunism reduced by facilitating the flow of information between companies. It is easier to build trust and enhance the flow of information in a closure than in a network with structural holes. Thus closure can be an efficient production system since the transactional uncertainty is reduced in it.

Tacitness is a source of transactional uncertainty, and thus it increases transaction costs. Tacitness can be lowered by *objectivating knowledge*. To objectivate knowledge a company can develop shared language and tools, common procedures, shared technical and organizational knowledge, long-term relationships and a shared collaboration code. However, the risk of imitation increases if knowledge is objectivated, and some of the knowledge can be very difficult and costly to objectivate.

If transactional uncertainty is high, companies cannot specialize but they have to maintain overlap. Specialized companies do not have knowledge and resource overlap, and thus it

is more difficult for them to specify and assess the service they are buying. Thus *specialization of companies* is a characteristic to look at in order to find out the level of information asymmetry.

In networks, where there are transactional uncertainties, companies can reduce transactional uncertainty by building trust. Building trust in a network is enabled by increasing information transfer through the network. A company can affect trust-building by causing *changes in information transfer*. Transactional uncertainty is likely to lead to close relationships, as companies make adaptations and create relation-specific investments to overcome uncertainty and to reduce the risk of opportunism.

Network Efficiency

Cost competition between KIBS companies is rare, but that is partly due to the low level of standardization. As the standardization increases, cost competition is likely to increase, and the production efficiency of the whole network increases. On the other hand, standardized services tend to be less innovative and have reduced information asymmetries. The opposite of standardized services are adapted services. Cheaper knowledge transfer translates into more efficient competition and more specialized companies. Competition is more efficient because the need for adaptations decreases. *Specialization and adaptation of companies* is thus a measure for efficiency of competition. On the other hand, the more companies specialize, the less *intranetwork competition* there is.

Decreasing transaction costs allow a company to produce at lower price, and thus companies facing *cost competition* are likely to decrease transaction costs. Tacit knowledge is slow, costly and uncertain to transfer, and thus objectivation is a way to decrease costs. A company can also aim at reduced transaction costs with a certain long-term client by adapting to its operations. Costs of knowledge transfer define what operations are carried out in-house.

Access to new knowledge and resources

A company can enhance its access to knowledge by facilitating the flow of knowledge in a network. A company can also build relation-specific or network-specific assets to improve its *access to resources and knowledge*. These kinds of assets are likely to be built in a closure position. In a closure, companies should also have better changes to exchange and create tacit knowledge. In a closure the knowledge is more likely to be complementary, and there is more competence overlap than in a broker position.

Innovation is achieved by combining different knowledge sets. Thus innovation may be promoted by accessing external resources. Company may search for new knowledge by using their networks. A central position in a network should mean that the company is in the network's nexus of innovation. A structural hole position should provide access to new markets and new knowledge better than a closure position, and weak ties that bridge knowledge bases are important for learning. However, tacit knowledge does not easily transfer through weak ties. The knowledge gained through a structural hole position should be explicit, but since it can be really new for company, it can also contribute to the

company's innovation potential. Thus the *broker/closure position* is an important issue to study in order to understand access to new knowledge and resources.

The broker/closure topic is interesting and ambiguous especially for KIBS companies: it has been stated that in these companies knowledge is their most valuable resource. Further it has been claimed that this knowledge must be tacit to be valuable, and it is created and transferred only through strong ties. Moreover strong ties are said to solely exist in a closure, however a structural hole position should be more valuable in terms of access to new knowledge.

5.2.1 Tacit knowledge, non-standardized (Type 1)

Transactional uncertainty is high. Transactional uncertainty is due to the tacitness of knowledge and lack of standardization. Transactional uncertainty causes companies to build relation-specific investments to facilitate collaboration and to safeguard against opportunism. This leads to close relationships. Transactional uncertainty is lowered by trust-building through information transfer, and there is a risk of opportunism because of the high information asymmetries.

Objectivating knowledge is carried out only to a certain extent to allow for the co-production of knowledge. Companies transfer technological and organizational competence to be able to objectivate knowledge. The service offered is particularized to each client. There is competence overlap because of competence transfer. Companies are small, as economies of scale are difficult to gain. Competition is not efficient as companies often particularize their services to the client, and cost pressure is low. Knowledge that is created is a valuable source of new innovations.

Companies are likely to operate in a closure with a high degree of trust and facilitated flow of information and knowledge. Companies in a closure can access external resources and are thus able to combine tacit knowledge, potentially leading to innovation. Competence overlap hinders the benefits that are gained from accessing knowledge in other companies, e.g. companies developing new technology could constitute an instance of a Type 1 company.

5.2.2 Explicit knowledge, non-standardized (Type 2)

Transactional uncertainty is not as high as it is in Type 1; this is because the information transferred is mostly explicit. Companies build trust to overcome transactional uncertainty.

Objectivating of knowledge is in an important process, as the knowledge is made explicit before the transaction occurs. Risk of imitation is increased. Cost competition does not play a significant role, but the potential of imitation brings some pressure on prices. Companies are able to specialize to some extent, and they can be larger, as explicit nature of knowledge makes it possible to act over the internet and through other means. There is

ambiguity in the degree of adaptation since the explicitness of knowledge reduces the need for adaptation, but on the other hand the lack of standardization induces adaptation. Since the service is not standardized, companies are likely to increase delivery performance by adapting to customers and forming long-term relationships. At the same time companies avoid small numbers –situations that might increase costs. There is potential for innovation, but it is most likely to be incremental.

Companies can achieve productivity gains on the network level via specialization. For example, companies can utilize complementary resources in a network. The explicit nature of knowledge provides access to new knowledge through weak ties, but it can also lead to an increased risk of imitation. A software development company is an example of Type 2.

5.2.3 Tacit knowledge, standardized (Type 3)

Transactional uncertainty arises from the tacitness of knowledge. This knowledge is not objectivated either because it is complicated or because it would cause rapid knowledge imitation. Standardization decreases information asymmetries, but does not remove them entirely: the client may also have knowledge and information needed. Information asymmetries create a risk of opportunism.

However, tacit knowledge is slow and costly to transfer; the cost can be reduced through reducing the search cost. Standardization increases the potential for cost competition, but tacitness of knowledge causes companies to aim for productivity gains through relation-specific investments and adaptation to the client. In this case, firms tend to be local and small.

Standardized services are found to be less innovative; however, because of the standardization, the customer and the provider do not need a large degree of competence overlap (e.g. buying legal consultation is possible without significant knowledge overlap).

5.2.4 Explicit knowledge, standardized (Type 4)

Transactional uncertainty is low. Information asymmetry is minimal because knowledge is objectivated and explicit in transactions. Productivity on the network level is increased, and companies can utilize broker positions.

Standardization reduces transaction costs and increases cost competition. Competition is efficient and companies are specialized. Adaptation to the client is low. Information that is transferred is not valuable for innovations, as it is easily imitable. However it is easy to access new knowledge even through weak ties; this creates innovation potential because the new knowledge can be combined. Knowledge overlap is very low. Firms can be large and not tied to location. Networks can be very productive and efficient. There is no need for closure, and it is beneficial for a company to be in a broker position. An example of Type 4 is a software product provider.

The framework developed in this chapter will be elaborated in the following empirical study. Empirical data will be analyzed under topics of overcoming transactional uncertainty, network efficiency and access to new knowledge and resources. The assumptions derived for each type of KIBS network will be assessed in empirical cases, as each case is first set to be in one of those types, and the assumptions for that type are used as a theoretical reference for a case unit.

5.3 Network strategies in KIBS context

The network strategies discussed above, i.e. the strategic network (Jarillo 1988), strategic business nets (Möller et al. 2003) and the business ecosystem (Iansiti & Levien 2004), give little indication of how the context of where the network operates should be taken into account. For strategic business nets, network stability defines the capabilities required to succeed in a certain network. Stability correlates with the maturity and purpose of the network. The strategic business nets model also addresses the innovation potential of a network. In emerging networks, where innovation potential is high, companies are considered to transfer tacit knowledge. The business ecosystem model highlights the significance of standardization for the efficiency of the network.

Network strategies take a stand on network centrality, network boundaries, network stability, network robustness, position within a network, transformation of business through a network, managing external resources, and end product. Dimensions of KIBS transactions impact some of these parts of a network strategy. Tie strength in network strategies was assumed to correlate with information transfer, whereas loose coupling was used when companies intend to gain new knowledge and learn in relationships. Specialization was recognized to be a core of different network strategies. However the way how specialization is pursued differs by models, as the assumed level of standardization varies.

Adaptation, trust-building, and enhanced information flows inside of the network in order to attain trust are emphasized in strategic network and strategic business nets models as a way to decrease transaction costs. The business ecosystem model instead suggests that standardization of interfaces (of a platform) is the way to achieve network efficiencies, allowing specialization and access to new knowledge, and thus trust does not play much of a role. In business ecosystem model, the broker position is considered to be useful, and in the strategic business nets model, the broker position is seen as valuable in the case of stable value systems. Stable value networks are the ones which utilize more standard transactions than, for example, emerging value networks.

To understand how KIBS transaction characteristics affect the applicability of different network strategies, the network strategy models are compared to KIBS network types (Figure 22).

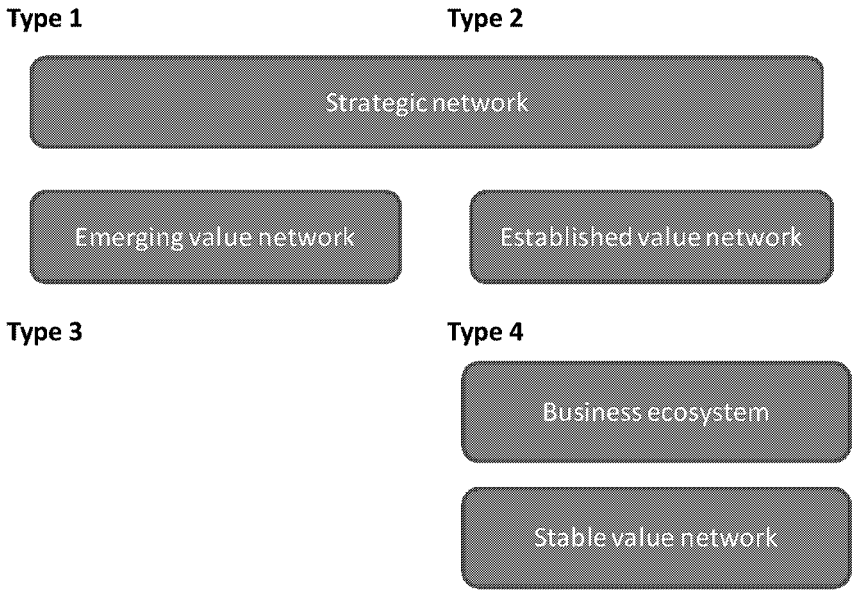


Figure 22. Network strategies in KIBS context.

A strategic network is described as consisting of strong long-term relationships, in which trust is the key to allowing flexible action. Transactions are described as relatively unspecified with regard to contracts, and tasks are said to be unstructured. All of this suggests a low level of standardization in transactions; however knowledge is described as explicit and tacit. In strategic business nets, stable value systems are suggested to have strong coupling, and in dynamic systems the structure is looser. Information transfer plays an important role in stable systems, whereas knowledge and information is transferred to create trust between parties in in dynamic innovation networks. In innovation networks, companies share knowledge, which is important for their competitive advantage, and this sharing requires trust. In stable value systems companies can utilize their central position to bargain over structural holes. In stable value systems standard interfaces that are easy to integrate into other activities in the net are appreciated, and the system has to be efficient and flexible. In a business ecosystem it is essential to build a standard-interface platform to allow loose coupling. Otherwise it is too risky for niche companies to join the platform, as they would be overly dependent on the hub company. Standardization and loose coupling also allows companies to access dissimilar information, and thus these aspects increase the innovation potential and robustness of the whole network.

6 RESEARCH PHILOSOPHY AND METHOD

> "To the superficial observer scientific truth is unassailable, the logic of science is infallible; and if scientific men sometimes make mistakes, it is because they have not understood the rules of the game"
>
> (Poincaré 1952, p. xxi).

The area of this study is in the field of social science. Social science constitutes of a wide array of research branches concerned with humans and human organizations, thus distinguishing from the natural sciences. Social science encompasses economics, history, political science, psychology, anthropology and sociology. But how does science in this domain proceed and how one can contribute to it? In this chapter the social sciences as a research area is discussed. To begin with, the creation of scientific theories in the social sciences is discussed, and its difference in this regard with the classic scientific disciplines is identified. Based on this discussion, the philosophical perspective of this study is explained along with its research method and the process of selecting of empiria.

6.1 Theory creation

The question how the knowledge is gained is handled in the field of epistemology. In positivistic thinking, there are two main branches in it. In classical empiricism ultimate source of knowledge is considered to be observation. Classical rationalism claims that the source of knowledge is intellectual intuition of clear and distinct ideas (Popper 2005). Science as we understand it was born in the seventeenth century. In seventeenth century science there were three sources of knowledge: revelation, light of reason, and light of experiences. Empiristics, who were also inductivists, were first to claim that scientific theories should be proven from facts. (Lakatos 1973) Probablism considered that statements that are highly probable can be accepted (Lakatos 1973).

Popper considers there are several possible sources of knowledge, but none of them can be considered to be entirely authoritative (Popper 2005). Because all sources are non-ideal, it is essential to try to eliminate errors by criticizing theories (Popper 2005). Thus Popper developed *critical rationalism*, the main claim of which is that the origins of knowledge are not significant: what is significant is whether an assertion (a theory) can be refuted or not (Popper 2005).

Kuhn defined a scientific paradigm as

1. "sufficiently unprecedented to attract an enduring group of adherents away from competing modes of scientific activity

2. sufficiently open-ended to leave all sorts of problems for the redefined group of practitioners to resolve" (Kuhn 1996).

Kuhn's definition does not explicitly exclude any theories that might be considered to be pseudoscientific. Demarcation criteria to separate between scientific and pseudoscientific are found in Popper's work. Popper concluded that

- It is easy to obtain confirmations, or verifications, for nearly every theory, if we look for confirmations
- Confirmations should count only if they are the result of risky predictions
- Every good scientific theory is a prohibition
- A scientific theory is refutable; testing it is attempting to falsify it, and confirming evidence is a failed attempt to refute a theory. (Popper 2005)

The problem in Popper's construction for demarcation is that he claims that when the refutation takes place we should refute the theory. Actually science does not evolve in that way. (Lakatos 1973) Lakatos claims that one hypothesis cannot be refuted, but only a conjunction of hypotheses. In real life hypotheses are not refuted, they are just shelved (Lakatos 1973). Lakatos explains that all theories are full of anomalies. This means that there are always problems in any given theory, and therefore they should all be shelved. Thus all theories are falsified, and should be refuted at their inception. Thus Popper's dichotomy collapses when considered in the context of reality. (Lakatos 1973)

Poincaré agrees with Popper regarding the testing of theories: A rule must be tested to falsify it; not to verify it (Poincaré 2003). Thus a researcher should never look for evidence *for* theories but only *against* them. How is that evidence found, then? Is a researcher an unbiased observer studying reality and deriving laws and theories on the basis of observations, as one might think ideal? Kuhn (1996, p. 15) claims that "in absence of a paradigm or a candidate paradigm all of the facts that could possibly pertain to the development of a given science are likely to seem equally relevant. Early fact-gathering is a far more nearly random activity." Thus observing is rather inefficient if one does not know what to observe. Recognizing that observation is always selective (Popper 2005, Poincaré 2003) a researcher should concentrate on facts that could lead to a law (Poincaré 2003).

Mere observation leads to nothing; observation must be used to derive generalizations (Poincaré 1952). According to Lakatos, in inductivism theories are supposed to be deduced from facts, but it is impossible to deduce a theory from facts. Thus building a theory is always a business of speculation. The main thing in speculations, according to Lakatos, is that one is aware that one is speculating (Lakatos 1973). Poincaré sees that every generalization is a hypothesis and thus should be subjected to verification; tacit and unconscious hypotheses are dangerous (Poincaré 1952). Popper claims that induction of theories from observations is a myth; the actual procedure of science is to deal with conjectures, whereas induction makes theories only probable rather than certain (Popper 2005).

6.2 Social sciences

It is both possible and desirable to apply science to problems arising in the social field (Popper 2005). Applying the criteria mentioned above is not simple in social science. Still even in social sciences there are more or less scientific and pseudoscientific theories, and research is as serious as in natural sciences.

A research programme is degenerating, if "(1) it does not lead to stunning new predictions (2) if all its bold predictions are falsified (3) if it does not grow in steps which follow the spirit of the programme" (Lakatos 1973, pp. 105-106). Social science is reproached for the lack of predictions. Lakatos (1973) claims that most of the thing called "philosophy of social sciences" is explaining away the weaknesses of social sciences. Social scientists should not be allowed to aim only at understanding and not predicting (Lakatos 1973). Popper defends social sciences by saying that society does not develop in a repetitive way and thus usefulness of social science does not depend on their power to predict (Popper 2005). Popper sees the main task of the theoretical social sciences to be to trace the unintended social repercussions of intentional human actions (Popper 2005). That is, to help us to see system level dynamics arising from individual action. Popper concludes that this does not provide us with predictive tools, but defines what the possible consequences of certain actions are (Popper 2005).

The postmodernist approach to scientific research is comforting because it allows us to know something without claiming to know everything. Knowing can be partial, local, and historical. Social scientists may not be objective, but rather situated speakers, subjective, telling about the world as they perceive it. (Richardson & St. Pierre 2005) Radnitzky (1970) claims that positivistic schools want to define an ideal of science for natural sciences and behavioural sciences. Their ideal science is monistic and reductionistic, and physics is considered to be closest to this ideal (Radnitzky 1970).

In social science and natural science the most essential difference lies in the context of understanding of the perceived object of study. In natural sciences the lack of reference to human experience is characteristic. (Palmer 1969) Social sciences attempt to capture human experience using hermeneutical interpretations. Hermeneutic human sciences study the objectivations of human cultural activity to interpret them and thus to find the meaning of them, to establish co-understanding of them, and thus bring forward the historical dialogue of mankind (Radnitzky 1970). In hermeneutics the focus is on understanding. This understanding is especially directed towards texts, but also towards other human works. Understanding takes place as well in epistemological as ontological questions (Palmer 1969). Radnitzky (1970) sees that using a method is an effort of the interpreter to measure and control phenomena instead of letting phenomena lead the study. Palmer (1969) accompanies Radnitzky and claims that a method structures the experience in advance. He also considers that conceptual analysis too easily is used as a substitute of understanding (Palmer 1969). This suggests that in human studies experience is more important than method, which is quite a strict opposite with positivistic views on what is good research. Are the methods used the only way to separate scientific research from witchcraft, or do hermeneutics provide us with other definitions?

In a hermeneutical study a process called the hermeneutical cycle should occur. Hermeneutical cycle is understood as a process where the parts and the whole are studied alternately. This cycle should lead to good understanding of the object of study; finding an inner unity of the text, free of logical contradictions (Radnitzky 1970). That experience is a disclosure of truth (Radnitzky 1970). Hermeneutical experience is linguistic and dialectical (Radnitzky 1970). Dialectical aspect is visible in human sciences in such a way that in principle the objects of a study can enter into a communication context with the researcher. As a result of that communication the objects of study may be able to change or modify their conduct on the basis of the understanding the researcher has built. (Radnitzky 1970) Hermeneutics recognizes the significance of context and history also in academic research. Hermeneutical experience is historical: "No development of knowledge without foreknowledge" (Radnitzky 1970). A hermeneutist considers the ideal, where scientific research is seen as free of presupposition, naïve and unrealistic. While hermeneutic and naturalistic (positivist) approaches are very distinct, they are also complementary. All research projects have hermeneutical stages where previous research is assessed or co-understanding is created (Radnitzky 1970).

A piece of hermeneutical family of interpretation is social constructivism. Social constructivism is "understanding social phenomena from the actor's own perspectives, describing the world as experienced by the subjects, and with the assumption that the important reality is what people perceive it to be" (Kvale 1996). The basic assumption in social constructivism is that reality is socially defined, and it is embodied in individuals and groups who have defined it (Berger & Luckmann 1987). Objectivity in social constructivism is understood as study of institutions that exist over the individuals, and which possess their own reality (Berger & Luckmann 1987).

This study can be defined as management research because of its sources of data and potential implications. Different philosophical standpoints are found also in management research. Easterby-Smith et al. (2002) discuss the differences of positivism and social constructivism as a basis of management research. They also admit that some pragmatists may combine those traditions in their study (Easterby-Smith et al. 2002). A point is also that the distinction may be clear at the philosophical level of management research, but in the specific methods or research designs the distinction is not that clear (Easterby-Smith et al. 2002). Easterby-Smith et al. claim that a researcher may be unaware of whether he/she is a positivist or a social constructivist. To decide whether this is one of positivistic studies or constructivist studies, the six points Easterby-Smith et al. (2002) present are discussed to determine the philosophical basis of a study.

1) Independence of researcher

Positivism expects that researcher and research object are independent on each other. However, this ideal is not always possible to realize. A social constructivist may carry out an action research and thus tries to utilize the interdependence of researcher and research object instead of avoiding it. (Easterby-Smith et al. 2002) A researcher doing a case study is seldom fully independent on the research object. Instead a case study may be carried out by a person working in the organization or otherwise bound to it. Because a case study researcher aims at in-depth study on a case, the access to knowledge and information in

the organization—and thus a successful execution of a study—require some involvement of the organization. Thus the case study is far from the positivistic ideal. A case study is similar to a social constructivist study, even though the utilization of interdependence is not necessarily very strong.

2) Sample size

A positivist aims at obtaining large samples upon which statistical generalizations can be made. A social constructivistic study might aim rather at a deep study on a small sample. Thus the question on sample size is also a question of depth of the study, and it begins with the choice of the research unit (Easterby-Smith et al. 2002). A case study is clearly of social constructivist nature what comes to the sample size. It does not aim at generalization through large sample size, but concentrates on a few units and tries to understand them.

3) Testing theories vs. generating theories

Positivist thinking expects that one has created a theory and a study is arranged to test that theory with data. A constructivist is likely to let data to create a theory. Easterby-Smith et al. (2002) remind us that putting data first does not allow one to abandon method, also a constructivist must use a more or less rigorous method in his/her study. A case study can be used either to generate or to test theories. A positivist expects that a study is arranged to test a theory. A constructivist may let data to create a theory. In this study existing theories are tested against data and complemented if possible. In this regard the present study follows the positivistic tradition.

4) Experimental design vs. fieldwork methods

Data can be gathered through experimentations or by doing fieldwork. Easterby-Smith et al. judge that experimentations are difficult to carry out in organizations (Easterby-Smith et al. 2002). This might be due to the uniqueness of organizations and irreversibility of changes made in them. Easterby-Smith et al. encourage researchers doing fieldwork and encountering things they do not understand by claiming that when the researcher does not understand what's going on, he/she has got a possibility to extend conventional wisdom (Easterby-Smith et al. 2002). Until that breakdown point everything has been know even prior to conducting the study.

As was previously mentioned, it is difficult to carry out experimentation with organizations. Experimentation may cause permanent changes to an organization, and thus experimentation is risky. A case study is likely to exploit fieldwork methods, and the possible fieldwork methods for a case study are numerous.

5) Universal theory vs. local knowledge

Positivists consider theories should be universal. In social science there are no such universal theories. Social theories should be understood in the relation to the context they are developed (Easterby-Smith et al. 2002). This is why a positivist may think that there is no such thing as "social science", because it fails to produce universal theories. However, local knowledge may be valuable in some contexts, and in management research it

certainly is of value. A case study produces local knowledge, and it may be generalized only to given limits. That kind of local and context-bound knowledge does not allow prediction like scientific theories allow.

6) Verification vs. falsification

In positivism seeking truth is important. Constructivism claims that "one should look for evidence that might confirm or contradict what one believes to be true" (Easterby-Smith et al. 2002). Thus constructivist does something similar to the falsification that positivists may do. However, a social constructivist can aim at verification of a theory. A strict positivist may think it is even impossible to verify, one can only falsify.

A case study may be used to test theories; however due to the localness of the knowledge that they provide they may also claim that a certain theory worked or failed in that certain case. Thus a case study does not fulfill the aims of positivistic truth-seeking. Actually theories do not have to be true in any sense; a working theory is more than most researchers ask: a working theory is true in a particular social reality. The characteristics of a study listed above suggest that management research, and social study in general, tends to be social constructivist rather than positivist. However, that does not mean one could not carry out a positivistic research in the field of management research.

Still the practice of doing management research can be considered from the point of view of a social constructivist and that of a positivist. A positivist supposes the research process to contain clear stages, unified data collection and objective attitude towards interviewees. Data is likely to be quantitative. A process of a social constructivist has no clear separation between phases, data collection is not necessarily unified, because it may be useful to change questions on the basis of information gained, and the research process may be iterative. Data tends to be qualitative. Easterby-Smith et al. remind us that quantitative methods are not fully synonymous with positivism and vice versa. (Easterby-Smith et al. 2002) This study represents hermeneutical philosophy. There is a hermeneutical cycle that goes through different theoretical bases and forms a theoretical framework as a synthesis of them. The cycle continues in empirical part of the study, where the interview material and documents are analyzed in phases and finally existing theory and empirical analysis allow the researcher to gain new understanding on the subject.

Hermeneutics gives credit to earlier research and recognizes that there is no knowledge before foreknowledge: Positivists also acknowledge that mere observation is inefficient if one does not know what to observe. Due to the earlier knowledge a researcher may also have unconscious hypotheses, which are dangerous if not recognized. Thus for a hermeneutic researcher it is good to retain in mind that the researcher is always speculating, and it is easy to obtain confirmations if one is looking for them: That is why one should not look for confirmations but for refutations.

6.3 Case study

Case study is such a multifaceted concept that it covers both a process of inquiry about the case and the product of that inquiry (Stake 2000). Case studies have been used widely in social sciences and economics, even though it has been in some contexts considered to be a weak method (Yin 2003). However case studies have some good characteristics which support their use as an academic research method. The main strength of case study is that it can exploit a full variety of evidence, which consists of documents, articles, interviews and observations (Yin 2003). For the formal definition of case study I go on to refer to Yin, who defines case study as follows:

"1. A case study is an empirical inquiry that

- investigates a contemporary phenomenon within its real-life context, especially when
- the boundaries between phenomenon and context are not clearly evident. --

2. The case study inquiry

- copes with the technically distinctive situation in which there will be many more variables of interest than data points, and as one result
- relies on multiple sources of evidence, with data needing to converge in a triangulating fashion, and as another result

benefits from the prior development of theoretical propositions to guide data collection and analysis." (Yin 2003, p. 13)

Choice of a research method is dependent on the research question and also on the phenomenon under research. Case study is a suitable method for studies concerning why and how contemporary organizational phenomena occur (Lee 1999, Yin 2003). The phenomena under study is within a real-life context, and is such that investigator has little control on it. There are three types of case studies: explanatory, exploratory, and descriptive. (Yin 2003) A case study is not a historical study, nor is it based on historical data; it is also not used for future studies. The connection to the real-life context makes it clear that the case study method is not suitable for mathematical research, and there is no need to use the case study method to study phenomena which are virtual and thus easier to control than real-life events. The case study method is best suited for phenomena which are difficult or impossible to study otherwise. Case studies may be the only means to examine all relevant aspects of the subject under study.

Business network strategy is a typical subject for a case study. A researcher has no control of the events that take place in the phenomena. They take place in real-life. It is possible to consider a case study also at the virtual level, but it never loses its real-life context. The phenomena have some time dependence, and even though the study is contemporary, it examines also events that occurred a decade ago. The subject under study can also be studied using other methods, like ethnographic method, survey etc., since a case study is not the only way to carry out qualitative research. An ethnographic method differs from

case a study as it utilizes close-up, detailed observations of the world by an investigator, and it is free from any previously known theory-base (Yin 2003). The ethnographic method was excluded from this study, because the actions that take place in business relationships are not easily observed by being present in a company. A survey might have been possible, but it would have likely left out some of the relevant sources of data, which a case study can exploit.

Research on business network strategies have been mostly case studies. Jarillo brought up the concept of a strategic business network as he carried on case studies, e.g. in 1993 a case study on Benetton's way of operating a business network. Möller, Rajala and Svahn use case studies of IKEA, Benecol and Symbian as a secondary data, and they elaborate the understanding of management in different types of networks. Håkansson and Snehota studied 14 case companies in order to contribute to an understanding of the dynamics of business networks. Iansiti and Levien (2004) have three case companies for studying the framework of the business ecosystem. Case studies are common, but there are also other methodological approaches. Dyer (1996) carried out a survey when researching networks in the auto industry. The dominance of case studies is likely to be due to the need for of theory development. The view of business networks as research entities and a network strategy as a research subject have emerged such a short time ago that there is no established model. Case studies are used to build up models and theories in this area of study, and the topic is still premature for testing.

Case study research is not essentially a qualitative method (Stake 2000). A case study is not a methodological choice, but a choice of what is to be studied (Stake 2000). The reason why case study research is often linked to qualitative study may be that in qualitative studies it is one of the rare possibilities, whereas quantitative studies allow other approaches as natural choices. However, in a case study setting essential is to choose a case that allows us to learn as much as possible from that specific case (Stake 2000).

6.4 Case unit

Anything does not form a case. A case is an instance defined by specifity and boundedness. A case is a system that has a self. (Stake 2000) Defining a case may be problematic, if boundaries are fuzzy. In that situation, a researcher defines a boundary on a chosen basis, and if boundaries had been defined differently, there would be a different case study. Thus a researcher chooses the case under study from an infinite number of possibilities. Some elements can be included or excluded, and when excluded they may form a context for the case (Stake 2000). The primary components of a case study are the research questions, theoretical propositions, units of analysis, the logic linking data to theoretical propositions, and the criteria for evaluating propositions (Lee 1999). As we see here, even though the case study is considered to be mostly a method of generating theories, the case study process includes testing certain propositions. This reflects the iterative nature of the social sciences: theory generation

In this case, there are several potential ways to define a case unit. Since the research problem concerns a network strategy, the most important definition is whether that do I

consider a business network or a company to be a case. At first, studying a business network as a case seems to be lucrative choice. A few problems emerge in that kind of study. Firstly, a business network is difficult to define in a way that would include all significant elements as they tend to extend infinitely. This would make a case study almost impossible to carry due to time, work and confidentiality issues. Secondly, since the study concentrates on the strategic choice of a hub company, studying a business network would not necessarily add value since most companies do not have an especially comprehensive view of the whole network.

Studying a company as a case emerges as the most natural choice. As revealed upon closer inspection, there are also some serious problems with that choice: Hub companies tend to be large, which means business units seldom pursue a unified strategy. Depending on the business they are in, and on the position they do have in that business, etc. units may engage in very different behavior. This leads to the choice used in this study: a business unit or a part of a company pursuing a unified network strategy forms each case.

6.5 Choice of cases

A single case may act as a sufficient basis for theory development. This is possible due to the possibility of analytic generalization. Yin points out that in the perspective of statistical generalization each case is a single sampling point, and therefore a single case is insufficient for statistical generalization (Yin 2003). A case may be representative, but since cases are not sampling points they should not be chosen on that basis (Stake 1995). There are five types of single case study; a critical case, a revelatory case, a unique case, a longitudinal case and a typical case. (Yin 2003) According to Stake, intrinsic cases are seldom selected, but an emerging case requires case study. In instrumental and multiple case studies cases are chosen, likely to be chosen on the basis of representing a phenomenon, which is the topic of the study (Stake 2000). Another criterion is potential for learning, which Stake sees as a different and sometimes even a superior criterion to representativeness (Stake 2000).

Even a single-case study may provide the requisite data to carry out an analysis and develop existing theories. This is due to analytic generalization, not statistical generalization. However, multi-case studies are recommended to avoid the hazards of relying on a single case. The risk to a researcher of relying on a single case is that the case may turn out to be different from the assumptions. Thus single-case designs require careful investigation of the potential case to minimize the change of misrepresentation (Yin 2003). This is difficult to realize in business research. The investigation of a case is not possible before the access to actual data, and at that point research design should be ready and it has often been accepted by the case study organization, so unexpected events sometimes occur in case studies. Unexpected events are actually taken into account as a natural occurrence and such events may actually represent a significant discovery. This may lead to the redesign of case study design, or at least some of the research propositions. (Yin 2003) The case study process may be iterative and different tasks take place simultaneously (Stake 2000). This makes the case study process challenging, but also self-reconstructive.

Management research differs from other forms of social and psychological research. There are the following differences: 1) management is about controlling, influencing and structuring the awareness of the others and 2) the subjects of the research are very likely to be more powerful than the researchers themselves (Easterby-Smith et al. 2002). Because managers are powerful and busy, it is not easy to gain access to fieldwork. Managers also presume that a study should lead to practical consequences that improve performance (Easterby-Smith et al. 2002). The last two characters are dependent on each other, because managers may see taking part to an interview as an investment that should produce some real benefit in future. That benefit might be results that serve as consultancy, goodwill, or access to new knowledge.

Easterby-Smith et al. separate a formal access and the informal process of gaining access to people and documents (Easterby-Smith et al. 2002). That means a person may have formal access to carry out research in an organization, but he/she may lack informal access and all people do not disclose their information or attitudes to the researcher. This may be due to the lack of trust either to the researcher or to the organization that orders the research. As Easterby-Smith et al. put it, official access is only the beginning of the story, the next problem is to obtain co-operation and trust inside (Easterby-Smith et al. 2002).

Even getting a formal access is sometimes hard work. 'Cold calling' is often useless, and essential enabler in getting an access is a personal contact (Easterby-Smith et al. 2002). In general they claim that it is easier to get through if the time and resources requested are minimal, project does not appear to be politically sensitive, and the individuals or institution have good reputations (Easterby-Smith et al. 2002). The requested resources may be time or money. The more an organization invests in those resources, the more benefits they should see from the research. Doing a significant study using minimum resources is not possible.

The case studies will deepen understanding of the issues that the theoretical framework has brought forward. In table 11 the discussed theoretical explanations are summed up and the issues which the empirical analysis will elaborate are presented.

Table 11. Theoretical and empirical answers to research problem.

	Theoretical explanations	Empirical explanations
How is competitive advantage gained in a collaborative business network dependent on the characteristics of knowledge-intensive business services?	Access to new resources and knowledge, access to new markets, innovation, reduced costs by lowering transaction costs or cheaper resources. Most KIBS companies pursue differentiation strategies, but in some industries cost competition has also lead to increased pressure for KIBS to low their costs.	In case organizations, what are the sources of competitive advantage that they derive from their respective networks, what would they like to derive, and what are the characteristics that affect to the potential for gaining different sources of competitive advantage

	Depending on the tacitness of knowledge transferred and the level of standardization, a company will choose to develop the sources of competitive advantage internally or to access them through a network. Relationships are complex, co-productive, long-term, unstructured, customized, and characterized by high information asymmetry and are difficult to alter. These characteristics can be reduced to a low level of standardization and a high tacitness of knowledge.	from a network. Understanding on the factors that drive the strategic choice of KIBS companies. Explanations of the characteristics that arise in case organizations and how they affect to the sources of competitive advantage the organizations derive from their networks.

The case studies that were carried out were instrumental cases (Stake 2000). The cases were chosen on the basis of random selection or information oriented selection (Table 12) (Flyvbjerg 2006). This study used information-oriented selection, as it allows for maximizing the utility of cases for the research problem at hand (Flyvbjerg 2006).

Table 12. Case selection types and their purpose (Flyvbjerg 2006).

Type of selection	Purpose
A. Random selection	To avoid systematic biases in the sample. The sample size is decisive for generalization.
1. Random sample	To achieve a representative sample that allows for generalization for the entire population.
2. Stratified sample	To generalize for specially selected subgroups within the population.
B. Information-oriented selection	To maximize the utility of information from small samples and single cases. Cases are selected on the basis of expectations about their information content.
1. Extreme/deviant cases	To obtain information about unusual cases, which can be especially problematic or exceptionally good in a sense.
2. Maximum variation cases	To obtain information about the significance of various circumstances for case processses and outcome.
3. Critical cases	To achieve information that permits logical deductions of the type, "If this is (not) valid for this case, then it applies to all (no) cases."
4. Paradigmatic cases	To develop a metaphor or establish a school for the domain that the case concerns.

The main criteria for case selection in this case are following (choices made in Table 13):

- Operating in KIBS networks
- Allow learning for many-sided sources of competitive advantage
- Extreme cases in the sense of the potential sources of competitive advantage gained in networks
- Access to companies

Operating in KIBS networks

For a company to be operating in a business network where transactions are knowledge-intensive services a company has to be either supplying or purchasing knowledge-intensive services. In this study the perspective is that of hub company (focal firm) purchasing knowledge-intensive services from its network, but the supplier side was also taken into account by interviewing supplier. The suppliers were interviewed to gain a deeper understanding e.g. of resource and knowledge complementarities, the efficiency of competition and transaction costs.

Allow learning on many-side sources of competitive advantage

The case selection aim not aim at selecting typical KIBS companies, but rather those which allowed for the most learning of networked sources of competitive advantage. The sources of competitive advantage have been studied mostly from the perspective of p-KIBS (Table 1). That is maybe because p-KIBS have been recognized as part of the KIBS group for a longer time than have t-KIBS. However the variety of sources of competitive advantage that p-KIBS companies pursue is likely to be narrower than the competitive advantage that t-KIBS companies pursue. This is because p-KIBS seldom face price pressure as they base their competitive advantage on social capital that is in the form of trust, and quality. T-KIBS also compete with trust and quality, but they are more innovative than p-KIBS, and operate in industries where increasing standardization causes increasing price competition, a t-KIBS company is likely to present a wider spectrum of relational characteristics and more sources of competitive advantage are pursued. Thus t-KIBS should allow for a wide basis for learning in this study.

The three case units are likely to be different in terms of the knowledge they transfer, but that is not possible to know beforehand. The level of standardization is also expected to be different between units. If units have different levels in standardization and tacitness, it will provide insight into the effects of dimensions on the competitive advantage that was gained.

The case companies chosen are extreme in a few senses that are essential from the point of view of competitive advantage: Companies are operating in an industry that faces price pressure, and that makes them cost-sensitive. This means they are more likely to explore possibilities that may reduce the effects of tacitness and a lack of standardization. Such companies may offer increased information on the nature of those factors, and the dependencies they have with KIBS characteristics. The case companies are extreme regarding their size. Most KIBS companies are small, but the companies under study are large even among manufacturing companies. If any KIBS companies can utilize

economies of scale and scope, they should, as they are both multi-unit service firms, they have wide existing networks they can use, and they are likely to use communications and information-handling technologies (Bharadwaj et al. 1993).

Cases are interesting from a standardization perspective, as they are chosen to represent KIBS companies, which operate in the ICT sector. ICT sector KIBS is likely to be unusual in their approach to standardization. In the ICT sector, standardization has been an important driver of development, especially in the telecom industry. There is a bias concerning the standardization in services, as on the one hand it has been claimed to lead to a lower innovation potential and on the other it is associated with higher innovation potential. IT related services are t-KIBS, and in t-KIBS innovativeness is higher level than in the average KIBS. Thus the ICT sector can provide important insight into the effects of standardization, and the aspects that drive companies and industries to the standardization of services.

Innovativeness is also linked to knowledge transfer, since according to KBV tacit knowledge is the source of competitive advantage, and strategic relationships should allow for the co-creation of knowledge. However that kind of relationship cannot possibly be weak tie that link knowledge bases and allow learning. Thus examining how KIBS in the ICT sector overcome the problem of tacitness allows learning on how the degree of tacitness affects the sources of competitive advantage gained, and it can also provide new information about the ways companies objectivate knowledge, and the limits of that objectivation.

Access to companies

Stake considers ease of access and hospitality as possible criterion for case selection (Stake 1995). In business related cases that is an important part of the criteria. In a study like this, access becomes a decisive criterion. As issues studied are closely related to the strategic decisions a company makes, few companies are willing to provide data for the study. Access to a company requires trust and interest on the topic. That narrows the number of possible companies for a case study in a significant way. In these circumstances, having access to two companies is a satisfactory result. A criterion in the selection of the case companies was access to relevant people in the unit, and those people are willing to invest time and resources into this study.

The case companies were accessed when they took part in a TIP research program, which concentrated on studying knowledge-intensive services. The TIP research program was conducted between 2004-2008 and it was funded mainly by TEKES, the Finnish Funding Agency for Technology and Innovation.

The first case unit is a part of a large Finnish company with a wide subcontractor and partner base. The second units are parts of a large U.S. based company, which also has a large amount of suppliers and co-operation parties. Thus they are highly linked in their respective networks, and provide insight into the network perspective for sources of competitive advantage.

Table 13. Case selection criteria and results.

Criterium	Operating in KIBS networks	Extreme cases that allow learning on many-sided sources of competitive advantage	Access to companies
What was selected	KIBS suppliers and providers with wide networks	Large t-KIBS companies potentially pursuing both low costs and differentiation potential	Companies which took part in a TIP research program

The choice of case unit was based on recommendations and information provided by the companies which participated in the research program. Interviews were initially made in four units, and three of them were selected as suitable case units. The fourth unit which was not used in this study was left out as its borders and transactions were difficult to define, and thus it would have not been comparable to the other units.

The biggest weakness in case selection is that before studying a case it is not possible to gain trustful insight in the levels of standardization and the tacitness of their relationships, and thus they may be similar or dissimilar in those terms. For that reason case studies are not intended to be compared to each other, but to the framework developed in chapter 5.

6.6 Data

There is a three-place relationship between theory, evidence, and background knowledge (Popper 2005, Lakatos 1973). Popper (2005) contends that the facts used to support a theory cannot be part of the background knowledge. A fact cannot be used twice, first to construct a theory and then to support it (Lakatos in Motterlini 1999). This must be remembered when carrying out a case study. The case study process is an iterative one, and that is fine. However it does not allow us to be irrational: It must be clear that empirical evidence is not used to create a model and to test it.

In data gathering, validation is often gained through triangulation (Stake 2000). Data triangulation is understood as the use of more than one source of evidence for certain information (Yin 2003). According to Stake a qualitative researcher should be interested in diversity of perceptions, and even in multiple realities people are in (Stake 2000). The possibility for data triangulation also strengthens the case study method, because it can exploit a wide variety of evidence (Yin 2003). There are three other types of triangulation which an investigator should pursue. They are investigator triangulation, theory triangulation, and methodological triangulation (Patton 1987 in Yin 2003).

Interviews are an important way of collecting data in case studies. This is because case studies are usually about human beings and human affairs. Human affairs have been observed by human beings, and thus human beings are able to bring some insight into the study of human affairs. (Yin 2003) Other important sources of data in a case study include

documentation, archival records, direct observations, participant observations and physical artifacts (Yin 2003).

Interviews also form the most important way of collecting data in this study. Investigator triangulation is carried out by interviewing several people on the same subjects, and by interviewing people in different case organizations. Besides interviews, internal and external company documents were used to bring a pre-understanding for the analysis of case units. In unit A about 30 pages of company internal documents were reviewed and 200 pages of external documents. About units B and C about 50 pages of company internal documents were reviewed, and over 400 pages of external documents. The pre-understanding creates a basis for analyzing interview data, and allows for an understanding of the industries and environments the units operate in.

Interviews in a case study are likely to be guided conversations and thus less structured than in survey (Yin 2003). Basically an interview follows the dynamics of any conversation. Fontana and Frey consider an interview to be a negotiated text. The interviewer is an active participant in interactions with the respondent, and thus the results of an interview cannot be taken out of the context in which the interview took place, and it cannot be considered objective data. (Fontana & Frey 2005) The most common way to carry out an interview is a face-to-face verbal interchange, either in a group, in person, and telephone surveys. An interview can be structured, semi-structured or unstructured. (Fontana & Frey 2005) In an unstructured interview, questions are usually open-ended, an interviewer does not aim for perfect objectivity or neutrality (Fontana & Frey 2005). In semi-structured and unstructured interviews the interviewer also analyzes the data. Structured interviews can be carried out by other persons, like many telephone surveys. Because this study used semi-structured interviews, the interviewer had to be researcher. Interviews were semi-structured, because it was assumed that interviewees, due to their diverse backgrounds, have different abilities in answering interview questions. A semi-structured interview allowed for further discussion on topics that an interviewee had special knowledge of. On the other hand the questions outside the area of specialization of an interviewee could be skipped.

Group interviewing is the systematic questioning of several individuals simultaneously in a formal or informal setting. Group interviews were generically designated focus group interviews. (Fontana & Frey 2005) A group interview may be rich in interaction, because interviewees may have discussions in an unstructured and informal interview, but it is also challenging for interviewer: he/she has to keep the interview on track and afterwards must remember who made what comment. One problem is that social pressure can condition the responses gained. (Easterby-Smith et al. 2002) In this study group interviews were used. The need for group interviews emerged due to the timetable limitations but it proved to be a suitable way to gather information. Social pressure was not thought to be interference because interview topics were not intimating for interviewees in any way. Instead the discussion of interviewees was considered to be fruitful on some occasions. As Easterby-Smith et al. (2002) notes, a group interview may enable a lively discussion, and a group can also provide social support. That means people speak more openly when they feel they are not alone of some opinion. They trigger each other to speak about things that might otherwise be forgotten or hidden (Easterby-Smith et al. 2002).

Interviewing never should be considered to be an objective, neutral or unbiased source of data, but it is historically, politically, and contextually bound (Fontana & Frey 2005). This boundedness refutes the tradition of the interview as a method of gathering objective data to be used neutrally for scientific purposes (Fontana & Frey 2005). The Interview as a process is not a neutral exchange for asking and answering. An interview is a collaborative effect for the exchange of people involved in the interview. An interview is active by nature; it is a contextually bound and mutually created story. An interviewer is a person, who has his/her own motives, desires, feelings, and biases. (Fontana & Frey 2005) Recognizing that helps a researcher understand how his/her own background affects the course of an interview and thus the resulting story. Obtained data can be taken literally, interpretatively, or reflexively (Lee 1999). Taking data literally means supposing the interviewee has told facts. Interpretative approach takes interviews or other material as including scatters of reality, and tries to derive reality from the basis of the material. The reflexive approach is an in-depth method, which requires a significant amount of insight from the researchers.

Case researchers have to rely on subjective data gained through interviews and documents. The major questions posed to interviewees concern experiences and not on opinions and feelings (Stake 2000). However, the real experience is often mixed with its interpretation, the feelings that it raised and so on (Stake 2000). However the opinions based on the experiences of an interviewee may be more important than the experiences below them, because people act on the basis of these opinions. Thus there are two ways to look at a study: (1) what has really happened, where the experiences are more important than the opinions, and (2) what may happen in the future (what realities are possible), where opinions on the experiences may be more important.

There are three schools of thought what comes to the interviews. Two of the schools are traditional. The first of them, the rational type, aims for the highest possible passivity of interviewer, and assumes that there is some kind of objective knowledge out there. The second school, creative, emphasizes the significance of feelings, and also assumes that there is a kind of core knowledge to find. New schools consider an interview to be a practical production of the interaction between the interviewer and the respondent; there is no "one truth" to find. (Fontana & Frey 2005) The last school has an interesting take on interviews. Recognizing that the narrative is created in the process of an interview also provides the feeling that we are creating new knowledge when interviewing: nobody else has asked these same questions of those persons, and they may have never thought about the topics raised in the interview. The interview is not a *naturally occurring* material which would exist without the influence of a researcher (Peräkylä 2005).

In this study, the data gained from interviews, company documents, or other sources that are likely to be biased, are not treated as objective facts. However, in the social construction the interviewees, perceptions are facts, and they conduct their behavior based on those subjective facts. Thus interviews are considered to be a reliable source when trying to find out how companies perceive their position and relationship to other companies, and how they conduct themselves based on those perceptions. Since strategy also involves everything that happens in a company, personal opinions and judgments reflect to the operation of a company as well as the official strategy of a firm. Coffey and

Atkinson (1996) also recommend letting different realities of social world to present themselves and, instead of trying to sum up different data sources to a unified truth, using them to elaborate ones understanding of the complexity of the phenomenon.

The empirical analysis is based on data gathered in interviews. The case companies selected who was interviewed based on who was the most knowledgeable about topics concerned. The characteristics used to identify a potential interviewee are:

- People responsible for partnering decisions in a certain unit
- People operating with a partner
- People working in a partner or subcontractor organizations

I assume that each company aims at highest possible competitive advantage, and seek to exploit all sources of competitive advantage that they recognize. Further, I assume that interviewees are familiar with the networking and collaboration strategies that a company uses. Interviewees understand the reasons behind the strategic choices that have been made, e.g. they know the reasoning behind using only a couple of partners instead of several, or aiming at a high branch in a network. Interviewees are also assumed to know what kind of competitive advantage the company and unit are seeking.

The potential interviewees were contacted, and those who were willing to be interviewed, were informed about the themes to be discussed in the interview. Specific interview questions were not provided in order to allow for spontaneous discussion. The interview questions that were used as a basis for semi-structured interviews are found in Appendix 1.

Interviewees were carried out in Company 1 between 20.10.2005 - 22.9.2006 and in Company 2 between 8.3.2007 – 23.4.2007. The case analysis represents the situation at the time interviews were conducted. The interviewees and their positions are presented in Table 14.

Table 14. Interviewees and their affiliations.

Reference to interviewee	Case unit	Position of company	Reference to company	Interview type	Interviewee
A1	Unit A	Focal	Unit A	Individual	Director
A2	Unit A	Focal	Unit A	Individual	Partner manager
A3	Unit A	Focal	Unit A	Individual	Head of Program Management & Quality & Processes
A4, A5	Unit A	Focal	Unit A	Group	Program Manager, Program Manager
A6	Unit A	Focal	Unit A	Individual	Program Manager

X1, X2	Unit A	Partner	Partner X	Group	CEO, Senior Consult
Y1	Unit A	Partner	Partner Y	Individual	Unit Manager
B1	Unit B	Focal	Unit B	Individual	Senior Project Executive
Z1	Unit B	Partner	Partner Z	Individual	Vice President
V1	Unit B	Partner	Partner V	Individual	Development Leader
C1	Unit C	Focal	Unit C	Individual	Director
C2	Unit C	Focal	Unit C	Individual	Distinguished Engineer

The number of interviews carried out in unit A was significantly higher than in units B and C. This is because Unit A was the first one to be studied, and it acted as a test bed for interview questions. When studying units B and C it was more clear who to focus on.

6.7 Analysis

There are three general alternative strategies in a case study (Yin 2003). Those strategies rely on theoretical propositions, thinking about rival explanations, and developing a case description. Developing a case description is not recommended, but Yin recognizes it as a possibility if the other two are problematic. If a case study is intended to be descriptive, developing a case description may be relevant. (Yin 2003)

When relying on theoretical propositions, a researcher analyses data on the basis of propositions, which he/she derived from the research question. Another challenging research strategy is to think about rival explanations. This strategy is especially good when there are no theoretical propositions. A research strategy has to be selected before data collection, and data analysis aims at proving any of the rival explanations to be true. If none of such explanations can be falsified, an explanation for the phenomena under researcher is found. If all explanations can be falsified then new explanations have to be developed. (Yin 2003) Rival explanations include real-life rivals and craft rivals. Real-life rivals should be identified before data collection even though some of them appear when collecting data (Yin 2003). In this study the analysis is based on a theoretical framework, which poses certain assumptions for case studies. The assumptions are not presented in the form of propositions, but as a description of each type of KIBS network.

Analysis is not a separate research stage, but it should take place in data collection and writing and may lead to further data collection (Coffey & Atkinson 1996). As true as this is, there is also a need for systematic analysis. Analysis methods in qualitative studies that are recognized include: categorization of meaning, condensation of meaning, structuring of meaning through narratives, interpretation of meaning, and ad hoc methods for generating meaning (Kvale 1996, Lee 1999). Coffey and Atkinson (1996) add that using a

general equation in qualitative analysis is like chopping data into pieces, examining pieces and finding connections and cause-and-effect relations between pieces. Analyses often begin with the identification of key themes and patterns (Coffey & Atkinson 1996). Key themes are found from prior material, theoretical frameworks, research questions, or the data (Coffey & Atkinson 1996). Most qualitative researchers do not follow a predefined protocol when analyzing written material, but their work is an ad hoc process, where key themes are recognized by recurrently reading the text (Peräkylä 2005). Analyzing data is at its simplest thinking with the data, developing ideas that are strongly rooted or related to the data (Coffey & Atkinson 1996). The way the analysis is carried out in this study is indentifying key themes in a theoretical framework, and using these themes to arrange case material into meaningful entities, and then using these entities to discuss whether each case represents assumed strategic choices, and assumed links between these choices and relationship characteristics. Empirical data are used to increase understanding to solve the research problems. Empirical data can raise such strategies and linkages which have not been recognized based on the theoretical framework.

The material gathered in the interviews was arranged under certain themes that reflect the different theoretical bases of competitive advantage (TCT, SC, RBV and KBV). Since the interviews were not fully structured, and interviewees occasionally strayed to other topics, the arrangement process was more cyclical than straightforward. The first cycles were based on keyword search in each interview, and then interview text was read through to avoid missing any relevant information. A keyword list was completed during the analysis process, and by the end of data arrangement the process was rather systematic.

The statements of each informant in a case unit were collected under themes, and they were assessed conjointly to form an overview of the theme for each unit. Each theme forms a part of the empirical evidence for a certain set of assumptions (transactional uncertainty, price competition, innovation).

The following themes that reflect the theoretical bases were chosen based on the discussion in chapter 4.2:

Overcoming transactional uncertainty

Transaction costs – transaction cost theory, explains what factors make collaboration costly and thus drive companies into either long-lasting relationships or only a few of them.

Changes in information transfer – By changes in information transfer a company may enhance knowledge and information transfer. Information transfer also has an effect on transaction costs, namely search costs and it increased trust.

Efficiency of network

Cost competition – the more companies are homogeneous in their resources and their connections, the more likely they are to compete in costs. Standards and explicit knowledge are likely to increase the significance of cost in competition.

Changing the characteristics of a market – A company may change the structure of the network it is in and create new channels to the market. It is likely to change the broker/closure position or the competition factors, like objectivation.

Appearance of intranet competition – if companies are specialized and adapted, they are likely to compete against other networks. If they are not, they are likely to compete against each other. Intranet competition increases the risk of opportunism and makes it more important to protect the sources of competitive advantage by maintaining information asymmetries.

Specialization of companies – collaborating companies tend to specialize. Specialization and adaptation are intertwined. Specialization decreases intra-network competition. Specialization causes companies to become dependent on each other. Specialization decreases cost competition inside a network.

Access to new knowledge and resources

Enhanced access to other companies' knowledge and resources – RBV & KBV, companies may gain a competitive advantage by combining external and internal knowledge and other resources and may create new solutions and products. Combining knowledge is also a source of innovation.

Broker/closure position – social capital, a company may have either type of social capital. Companies who protect themselves from opportunism are likely to operate in a closure. A broker position may be valuable, if a company needs to access heterogeneous resources and knowledge.

After discussing each case under these themes, I proceed to the analysis, where each case is classified under a certain type of network. Each case gains certain assumptions from theoretical framework according to its type. The findings in the case studies are reflected in the assumptions derived from the theoretical framework. Finally the theoretical framework is completed based on the findings.

6.8 Generalization

Case studies are valuable in defining theory, suggesting complexities for further investigation as well as helping to establish the limits of generalizability (Stake 2000). A case report does not need to explain the world but to explain just that one case: thus the requirement for generalization should not exist. The utility of case is in its extension of experience, not in the generalization. (Stake 2000) Thus a case study aims at optimizing understanding of the case under study, not generalizing it on the basis of a single case. Credibility to a case study can be attained by triangulation, which still does not encourage generalization, but rather justifies the conclusions made based on the case. (Stake 2000)

Types of generalization include: naturalistic generalization, statistical generalization, and analytic generalization. Statistical generalization, which is derived from random samples (Kvale 1996), is not possible in a case study. Naturalistic generalization is based on the

researcher's personal experience, analytic generalization on its behalf is based on the similarity of contexts (Lee 1999). Analytical generalization is a reasoned judgement of how widely findings can be applied to other situations, recognizing the context-dependency of a case study (Kvale 1996). The results of a case study are generalizable through analytic generalization, which means that they bring out theoretical propositions that are also applicable cases other than those under study (Yin 2003). In this study analytic generalization is applied. Generalization is emphasized to too great of a degree in the methods discussion. Pressure to generalize may cause a researcher's attention to move from an understanding of a certain case and its features (Stake 2000).

7 EMPIRICAL ANALYSIS

This chapter presents the cases and discusses them based on the themes suggested earlier. There are three cases, and the focal units (Unit A, Unit B and Unit C) are located in two separate companies, which are referred to as Company 1 and Company 2. Companies that collaborate with the focal units are referred to as partners. The sections describing the case units on a general level (7.1, 7.2, and 7.3) are based on company documents and public sources. Other sections in this chapter are based on interview data.

7.1 Unit A

Unit A is a part of a joint venture between two globally operating large corporations. The joint venture produces both goods and services, and the services it produces are technical services, which are knowledge-intensive services. Thus the joint venture is a provider of t-KIBS. It is also an important buyer of both goods and services.

Company 1 is considered to be an important node in the Finnish ICT cluster. The ICT industry is a main driver of productivity growth in the European Union and in the USA (Fagernäs 2005). The Finnish knowledge economy is mainly built on the ICT cluster, which consists of digital content provision and packing via network infrastructure, equipment manufacture, and operation of end user terminals and portals (Ylä-Anttila 2005). The main collaborators of Unit A produce knowledge-intensive services and are situated in Finland. Thus the study of this unit concerns business relationships with Finnish companies.

Technological development in the ICT industry is rapid. To succeed in fast-paced product development and production, companies must be active in making co-operation agreements with other organizations (Ali-Yrkkö 2001). Also the tendency to outsource functions that have been previously done by the organization itself has led to the increasing importance of co-operation with suppliers. This co-operation is nowadays a part of the firm's strategic decision making, and on the other hand, for suppliers this means a closer co-operation with customers (Ali-Yrkkö 2001). In a knowledge-intensive economy the close co-operation with other companies and organizations causes firms to be dependent on the knowledge resources of other firms (Ali-Yrkkö 2001). The Finnish ICT cluster is facing major challenges in the near future. China and East Asia are becoming the most important production bases and ICT goods manufacturers (Ylä-Anttila 2005). Competition inside the Finnish ICT cluster has been promoted by legislation (Svento 2005).

Unit A is a unit producing a platform, and it has several sister units. A platform is a product integrating both hardware and software, and it is used as a basis for different end product lines. The platform is an element capable of executing certain basic functions. Each product line builds their own product by applying new functions to a platform, and those products are sold to end-users. The end-products are devices performing complex

functions as a part of a larger system. Unit A has four product lines since customers and each product line may build a few variations into the end product.

The product of Unit A is constantly under development. Both software and hardware modules are improved and adapted to new technologies and requirements. The structure and function of the product is permanent, but the software and hardware modules executing them are not. Since the product has existed for a long time and thus it is relatively old, there are hardly any modules that were in the original build. The development of the product is carried out as development projects which include both software and hardware projects. Hardware projects are implemented in a separate unit, which produces hardware for Unit A and its sister units. Software development is done in Unit A. In software development Unit A uses subcontractors and partners, who sell mostly hour-based service work. The software product that Unit A produces includes both software and technical support. The software development – technical support ratio is about 80-20. To develop a new version of the platform requires hundreds of thousands of work hours. Small part of this work can be bought as a ready-made module, and most of it has to be developed either in-house or by buying development services from collaborators.

7.1.1 Overcoming transactional uncertainty

Transaction costs

In the choice of a collaborator the characteristics sought are competence, reputation, financial stability, collaboration experience, price, sustainability and organizational culture (A1). A search is first conducted among the previous collaborators because there is information about those companies and perhaps a framework for contracts (A3). Using previous collaborators lowers search costs, contracting costs, and relationship building costs, and there is already a degree of trust (A2). If the search does not provide results, the second search is on all market (A3). Starting collaboration with a new company requires an evaluation process with visit and interviews, legal analysis, financial analysis, competence assessment and reference checks (A3). It takes a lot of time to audit, contract and negotiate the price (A6). The choice of collaborators is also important because contracting costs are high:

> "If we have to constantly make changes to contracts, contracts are not held and the interface is altered [which may lead to termination of a contract]. Not necessarily [due to a] lack of competence, but [if] an interface that has become too burdensome, taking time and money – That kind of case causes surprisingly high costs." (A2)

There are several collaboration models. Some subcontractors work in the premises of prime, some carry out projects on their own premises and with their own management (A1). Partners have gone through a referral process (A1). Collaboration parties synchronize their processes over times and exchange best practices (A1). Collaboration

requires a transfer of competence and it is a big investment to take a company to the development program (A2). Extensive competence transfer and collaboration requires the use of the same information systems and development environments (A2, A6, A4, A5). That does not allow for short-time partnering. (A3), and limits the manageable number of partners (A4, A5).

A hardware partner provides a whole element with hardware and software. Most hardware collaborators only provide hardware without any software in it. Software is made in-house or by a software collaborator (A3). A global standard for computing architecture (HW related) has gained ground, and may change situation in future, and this would lead to a decrease in transaction costs (A3). At the moment, Unit A is buying services with high transaction costs (A2). Software modularity would also transaction costs (A2), but at the moment software as a service is highly customer-specific, and there is no standardization. (X1, X2). Thus it would be impossible to sell the same service to another customer, even if it was acceptable to the primary customer.

Collaborating with a limited number of collaborators leads to a small numbers situation, which increases the risk of opportunism. Unit A is in a situation where it is overly dependent on Partner Y because of the extensively specialized competence it possesses (A3). Dependence increases costs, as there is no genuine competition (A4, A5). In software collaboration there is generally a small numbers situation, as an IP stack is the largest element that can be bought from several suppliers (A2). In hardware there are several potential suppliers for each element (A2), and thus the small numbers situation is present only in software supplying. The choice is often between buying software and producing it in-house, as there are very few tasks that Unit A cannot do by itself (A2).

Trust is an important factor in collaboration (Y1). In hardware, strong trust allows for unwritten contracts and flexible collaboration (A3). Also in software production collaborators often launch projects before written contracts are completed, as there is trust between parties (Y1). Daily contact with the software suppliers enables collaboration, since there is less misunderstanding and more trust (A2). Trust makes collaboration more flexible, and reduces transaction costs:

> "[Trust] is supposedly experience-based, we believe and trust that everything works out." (Y1)

> "As a customer may have a terrible long contracting process, we make tentative oral contracts about initiating a project, even if the formal contract is not ready. There we take some of the risk to ourselves; we are willing to take the risk of not getting the formal contract." (X1, X2)

The overhead that collaboration brings in is in the form of contract monitoring, reporting and planning (A6). There are double meetings since not all issues can be handled with collaborators (A6). Collaborators meet on three levels of resource interface: contracting level, technical level and implementation level (X1, X2).

Subcontracting work requires a good knowledge of the competence area (A6). To specify orders and the desired result in intangible products needs knowledge in prime (A6). Added overhead in project management often makes specifications appear fuzzy (Y1).

Company 1 avoids search and contracting costs by using companies they have used before. If there is need for new collaborators, transaction costs are high since there is an extensive evaluation process for potential collaborators. The evaluation is done profoundly because collaboration requires competence transfer and adaptation, and thus it is not easy to change collaborators if there are problems in the relationship. There is also a risk of lock-in situation in long-term commitments. Trust decreases contracting costs and monitoring costs, and allows for flexible deliveries.

Transaction costs could be lowered at the industry level by standardization, which is an ongoing process. Increased modularity also allows for more flexible collaboration, since the software is customer-specific. In certain areas software is likely to stay customer or solution specific, as a modular design would be too complex or have low-performance.

Changes in information transfer

Collaborators share the same information systems and that causes problems with information security (A3). Partners have an access to a project net inside a firewall and the access to documents is defined by permission sets (A6). However companies are very trusting even though there are collaborators who also collaborate with competitors and there is a possibility of unintentional leakages (A6). Subcontractors do not access an intranet, but document sharing tools are used (A4, A5). Collaborators are requested to use the prime company's tools (A4, A5).

An important way to share information is in regular meetings that concern strategy, internal priorities, goals, problem situations and future needs (A1). There are two monthly meetings, one concerning project management and one fault management (Y1). Partner Y takes part in program management team (A4, A5). Collaborators with a partner status have access to strategically important information (A1). Some collaborators work at the prime company's premises and thus have daily contact with the prime company (A4, A5). Open and frequent contact and information transfer is essential because subcontracted parts are so tightly interwoven in the product (X1, X2).

Since the clients are mostly internal, the information about the business environment and customer feedback is filtered instead of raw (A3). Client information comes in the form of strategies created with internal clients (A6). Collaborators provide operational information concerning project execution; collaborators are not a source of strategically important information (A3). There is only one partner, Partner Y, who shares information on their business, others limit information sharing to operational information (A4, A5). Information transfer is complicated even inside a large firm, and collaborators make it even more challenging (A3). Information transfer between collaborators is on three levels:

technical managers transfer technical information, business managers take care of contracts and there is the daily operational contact via e-mail, meetings and phone (X1, X2)

Company 1 wants the collaborators to use the same information systems and development tools. That causes a need for extensive adaptations and causes problems with information security, as strategic information has to be protected. Partners have access to strategic information, but subcontractors have not. Partners are not seen as sources of important information in a strategic sense, and thus communication is on an operational level.

Frequent information and knowledge transfer is necessary for collaboration, since subcontracted parts are interwoven with the product, and the interfaces are not standardized.

7.1.2 Efficiency of network

Cost competition

The success of a platform is measured on the success of end products, which are the applications (A1, A3). An important source of success is the quality of the platform (A1). Unit A produces an old and well-tested product and it can be provided at low cost (A3). Collaboration brings cost efficiency only in the situation where a subcontractor has several parallel clients who buy services in the same competence area. That leads to development of that competence and cost efficient production of that service and independence of the producer (A3).

> "[Outsourcing] is cost-efficient only if a subcontractor or partner has other customers in the same field. – In this situation it is terribly difficult to develop a business model between them and us that would allow us to purchase that work at a cheaper price than we would pay in-house, and give them enough money. Prices are unavoidably going up so that we could make it in-house at the same or lower price. — It might even make sense that an area where a subcontractor has gained competence in collaboration with us and maybe other customers, they would develop a product which they could sell independently. That would make sense."(A3)

Unit A competes on quality, customer satisfaction, technological competence and reliability of products (A2).

> "Since integrating is challenging it is not always sensible to buy each part from the cheapest offerer" (A2)

> "And of course technical competence, quality of competence is a critical factor, otherwise we would not have much to give, likewise keeping up to schedule is

very important these days. And you cannot really leave the price out, it is an important factor, but I would not say that the most important.—I suppose we are not cheap, but cost-efficient in a sense." (X1, X2)

However, in the industry there is heavy cost competition that causes pressure to lower costs for everybody (A2, A6, A4, A5, Y1). Telecom operators compete heavily on prices, and that reflects on the whole industry leading to price competition (A2). Cost pressure brings tough partnering contracts, whereas the common interest is the maintainability and renewal of the product (A6). Cost competition drives subcontractors to open subsidiaries in cheaper countries (A2). Outsourcing is used to decrease fixed costs (A4, A5). Short-term cost reductions from subcontracting may cause problems in the long term (A2). Price combined with competence is a decisive factor in collaboration (X1, X2).

"Price is a factor as well, mostly so that it is a make-or-buy decision." (A3)

Success is partly dependent on the success of collaborators, since either a very successful or an unsuccessful partner may cause problems for collaboration (A1). For subcontractors a successful customer may bring more subcontracting, but on the other hand a customer downsizing its operations may increase subcontracting (X1, X2). In general the prime's benefit is also its subcontractor's benefit (X1, X2). Win-win situation is clearly visible when collaboration is going right (X1, X2). The interdependence of success is strongly interconnected to the level of adaptation between companies and risk sharing (Y1).

Collaborators have been mainly successful, they have been learning and acquiring new competences and internationalizing along the prime (A1). Collaborators provide new innovation potential to a routinized production of platform (A4, A5).

Cost competition is an element, as the end-products are under price pressure. Unit A produces an old product, which can be produced at a relatively low cost. Innovation is mostly incremental, and collaborators are not used for accessing new knowledge. Thus collaborators are used mainly to even out resource needs, and thus lower fixed costs. However, since there are factors that drive long-term subcontracting with smaller numbers of suppliers, collaboration is not based only on cost.

Changing the characteristics of a market

Unit A does not carry out standardization, since it is a process that is centralized in Company 1 (A1, A2). There is a long tradition of collaborating with universities and taking part in research projects (A1). However, collaboration is not a specially large or significant part of product development (A2). Unit A has mainly internal customers. Unit A provides clients a platform; internal clients and one external client sell the end-product to the final customer (A3). So the customer market is quite stable for Unit A.

The collaborators of Unit A do not have mutual collaboration, but they have overlapping and have similar resources (A1). There are a few three-party contracts with subcontractors and prime, but they are not common (A4, A5). Collaborators do not form any community

(A4, A5). It is unclear what the collaboration strategy is (A4, A5). Company 1 is in a commanding and directing market position in supplier market, and collaborators aim at answering their resource needs (A6). Company 1 would benefit if there was a genuine competition in software supply. However partners must be treated with respect, and there has to be some kind of stability to the use of subcontracting (A4, A5). There are some companies that are very dependent on Company 1 as a customer, and they would not exist without it (A4, A5).

There have been spin-offs from Unit A which now operate as subcontractors (A2, A4, A5). Competence transfer, teaching development environments to the partners, copying the development environments of partners are ways in which Unit A has affected the competence development in the community it acts in (A3).

Unit A has created opportunities for many collaborators to develop and grow, and there have been spin-offs that have developed to supply Unit A. Unit A has also transferred competence to its suppliers. There are several firms that would not exist if they had not grown to supply to Company 1's needs. However, it has not changed the market structure.

Appearance of intranet competition

Prime company faced a co-opetition situation as a competitor had bought one of its subcontractors (A3, A4, A5). In a co-opetition situation the competitors are most likely to be able to use the information gained from subcontracting to plan their competitive actions (A6). Prime company wanted to eliminate that situation as was not willing to take the risk of collaborating with a direct competitor in that area (A4, A5). There is always a risk with small subcontractors that a competitor buys them and prime company is dependent on their competence (A4, A5). Company 1's contract hinders collaboration with other customers, since in some situations a person participating in Company 1's project cannot work with another customer for half a year.

> "I would that say the fear with such small partners is exactly that a larger competitor buys them out, so when they are partnering with them, collaborating, they become non-substitutable and thus it may be beneficial to acquire the small partner, there is a lot of such buy-outs." (A4, A5)

> "Finnish people are very naïve collaborators, too naïve and open, not obeying the rules that the security department is suggesting all the time, and now there has been copying our products and things like that, captures or whatsoever. But I suppose we are a suitable target for that, all Finnish companies, but especially us, we are not frightened about leakages, so we should, you know, be more aware that subcontractors are also subcontracting with other companies, and there may also be leakages involuntarily, maybe unintentionally." (A6)

Partner X decided not to contract with companies that are direct competitors of a customer to avoid difficult situations, and some of their customers forbid collaborating with certain companies (X1, X2). As subcontractors supply the prime company with specialized products they cannot use the same products for other customers (A1). Intranet competition is faced in the form of the division of the value; Company 1 is a tough contractor, limiting the rights of subcontractors (A3).

> "Since they [the contracts] widely secure the rights of Company 1, you could say that inversely the partner has no rights to what they have been working on when the job is done." (A3)

> "In my opinion a blossoming subcontractor is a better subcontractor also for prime, so if the job is done tight-belted and there is the taste of blood in the mouth, it won't be of high quality and the results are according. So if everybody is doing well there is a clear win-win situation. So it is also beneficial for the prime that a subcontractor is doing well. So I don't see a strong contradiction there, so that prime would be abusing subcontractors." (X1, X2)

Different units of the prime company compete for the same resources and competence among the collaborators (A1). If a partner is very successful that may cause difficulties for prime, since they may not get enough resources allocated for their own projects and orders (A1).

Software producers often are specialized and thus competition is low (A2). Competition is lowered also by high search costs (A2). Low competition reflects to the possibility of monopolizing some kind of subcontracting (A4, A5). Modularization and standardization increases potential for competition, but in SW development is slow (A2). Standardization would affect competition, as companies may find it more difficult to differ (A1). Prime would benefit from competing subcontractors (A1). Two or three collaborators supplying same product would be ideal as the interface would be manageable (A4, A5).

Unit A avoids intranet competition. Co-opetition is seen as a threat, because knowledge and information leaks are possible. Company 1 limits the possibility of its partners to work with its competitors. There is also very little potential for the use of software developed for Unit A with other customers, because the product is so specific and contracts are so limiting.

Inside supply network companies compete over value sharing. Software producers are specialized, and the specialization and adaptation lowers intranetwork competition. Competition is low also because of the high search costs. Company 1 would benefit if there was more competition amongst software firms, because that would lower costs.

Specialization of companies

Subcontractors are chosen on the basis of their competence (A1). However in collaboration the main goal is to even out resource usage, and thus subcontractors are not very specialized (A1, A3): some collaborators have special competence not found in others or the prime (A3). The specialization of subcontractors is seen as a positive thing allowing for a larger customer base and competence development (A2); however in the case where a collaborator have a special competence that prime is lacking there is a problematic dependence situation (A3). Prime would prefer to either have similar competence in-house or two or three potential collaborators who have that competence. However, in several areas it is not easy to find similar or better subcontractors (A6). This is due to the very special product Company 1 produces and thus the rare competence it utilizes (A4, A5). Sourcing competence that is not found even at a basic level in-house may cause problems, e.g. due to difficulties in the specification of work (A6).

> "In a sense we have formed an outside development unit, so that a customer has not built competence in-house but is trusting that as they need it they give us a call. So we have had an impact on the structure of some customer companies." (X1, X2)

> "Totally. In some areas of competence, totally. – And in my opinion that is a bad situation, as I think that even if we are using subcontracting the technical and architectural leads should be in Company 1. To let them do the work. But in a way keep the responsibility on architecture in prime." (A6)

Collaboration has led to competence transfer to collaborators and the loss of some competence, like statistical competence and testing (A6). Several collaborators are spin-offs from prime, and a partner is a result of selling a part of prime, which become then an important supplier (A4, A5). Collaborators develop those competence areas, and thus prime can source better competence than it previously had in-house (A6). On the other hand that has lead to a dependence on collaborators in these areas, and it is crucial to keep the competence related to product architecture in-house (A6). Contracting policy hinders the possibility of subcontractors to utilize the elements developed with Company 1 with other clients, however the competence developed they can use with other clients (A6, A4, A5).

> "Especially in projects of a certain customer we are in the forefront of a known technology, while it is some sort of studying for both us and the customer, that we are taking standards, which do not exist existing yet, and begin software development on that basis, in that kind of situation the starting point is that we are studying together, as no one really knows the area." (X1, X2)

> "It does not help us if a company is divided into five or ten parts, that would just increase the confusion. But outsourcing forms an independent unit, the competence base and perspective of which are elaborated, and thus there is more of a potential to concentrate on a certain kind of know-how." (A2)

Software producers usually give all rights of developed software to customers, and this is partly due to the difficulty of reusing software (X1, X2). In software modularity this is difficult to apply, as generic modules increase documenting overhead and might decrease software performance (X1, X2). Partner Y has developed only a few generic software modules that can be used across all customer projects (X1, X2). Partner Y sells R&D service for a customer's product, and does not as well own the IPR on the results of that development (Y1).

Prime has developed its integrator and partner management skills during the past fifteen years it has been using collaborators in that field (A6, A4, A5). Collaboration has also lead to a better focus on the core competences of prime and used its resources to develop the product architecture (A4, A5). That has led to the possibility of increased production. Subcontractors have also increased their activities in that area, as Partner Y reports that subcontracted work has doubled in five years (Y1).

The specialization level is higher in software production than in hardware production. In hardware there are several potential providers for a certain element (A2). Standardization and development of off-shelf products would allow the sourcing of larger parts from collaborators (A2). Collaborators would like to use the results of their work more widely:

> "They tell us they would like to use the same things with different partners." (A2)

> "In software development there is no bidding process. – In software the toil and trouble to find a new supplier does not pay back, it is expensive and it delays product development. In the official process there is bidding, and that is gone through in a way. Often it is not worth of putting together pieces of a whole that e.g. Partner Y is supplying, as integrating would be troublesome." (A2)

Partner Y has developed its competence in a co-evolutive process with its customer base (X1, X2). In each customer relationship they aim at developing competences, and in certain projects they have been developing new technologies and standards (X1, X2).

> "We look for customers on the basis of the edges, so that ok, we know how to do that basic thing, but not that edge, and with that company we could learn it. To get on with them, and in each project we are in we try to learn something new, so it is a built-in pattern in us in any ways." (X1, X2)

> "We sell competence. This is basically technical consultancy. – consultancy, perspective, competence, and also raw implementation power. But if compared to some of our competitors, we never sell such a bulk pair of working hands, but we think wholes and further. – We try to keep a certain technological focus. We do things that the others do not do, are not willing to do, and what we perceive as suitably challenging." (X1, X2)

Software firms are specialized, but Unit A wants to keep all competence that is crucial for product development in-house, and thus there is overlap in the competences. The specialization of subcontractors allows them to develop certain technological areas to a higher level than Company 1 would have achieved. Unit A avoids dependence on a single supplier in any technological area. Similarly Unit A wants to maintain sufficient competence on any technological area to avoid problems in specification.

7.1.3 Access to new knowledge and resources

Enhances access to new knowledge and resources

Partnering allows companies to access each other's strategic information (A1). Partners that have a large network can provide information about the industry on a general level and act as a consultant in projects (A1). Organizational boundary always hinders information transfer. Different organizational cultures also increase boundary, and companies producing services have different operations and different attitude than companies producing goods and integrated systems (A1). Company 1 produces an integrated software-hardware product and it mostly buys services and hardware (A3). Software subcontractors sell pure services, as a representative of Partner X's describes:

> "We are selling competence, technical consulting, know-how, perception and working hands; however in a certain whole". (X1, X2)

Company 1 uses collaborators to even out resource usage and to add variability, flexibility, centralization and complementing competences (A1, A2, A6).

> "More than once we have been the ones who have educated the customer on the issues concerning their own systems. Even if it has nothing to do with the piece we have constructed, but on a more general level." (X1, X2)

> "We have common processes, we get their comments about those processes, they take part in the development of our processes. Something that has worked out well with another of their customers, and they suggest that we implement that in the processes between us, we get fresh perspectives. Innovations. – We have been doing the same thing for a while in the same way, and innovativeness may fade away, the partner may have new ideas. That is a way to get them to us." (A4, A5)

Resources are important especially for balancing workload (A3). Access to competence is also an important reason for partnering (A1, A3, A2). Interest is in the extension of competence and independent development of that competence in partner organizations (A2). Collaborators develop their resources to answer to prime's needs (A6). However it is not easy to find the right competence in competitors and a higher level of competence than in-house can provide (A6). Partner Y carries out software development and most collaborators do the same (A2). Partner X has special competence in low-level software

(A2). Partner X's customers are all technological forerunners and the quality of competence is essential (X1, X2). Thus Partner X is used to gaining special competence. Outsourcing has led to a transfer of responsibility and competence to such an extent that Company 1 lacks some competences, and it would take some time to acquire them again (A3). That has led to a dependence situation with Partner Y (A3). Prime and collaborators have widely overlapping competences and thus most work can be carried out in-house if the price of subcontracting is too high (A2).

Competence transfer is a prerequisite of collaboration, as the software development environment is copied to collaborators (A3). Companies increase performance level in relationship with adaptations:

> "In our projects the structure is such that we construct one piece of it and the customer constructs their own piece of it, and thus we need a lot of communication. E.g. if we are doing two pieces, that are tightly interwoven, we try to keep communication open so that no detail can escape us, and the parts will be easy to integrate at the end of the day." (Y1)

> "We have adapted our processes in large to Company 1, so that we have our own way, but we are pretty much adapted to them. So that we have the same interface with them as they use internally." (X1, X2)

Subcontracting is easiest in the areas where the prime company has basic competence (A6). Subcontracting in areas that are unknown within the prime creates the problem of defining that work properly (A6).

> "Where I find it insensible to use subcontracting, and we fall into that pit again and again, is when we're about to do something totally new, e.g. in the hardware development of a new unit, a new technology, which we have not done ourselves, that never works out. The problem is usually that we fail to define it properly." (A6)

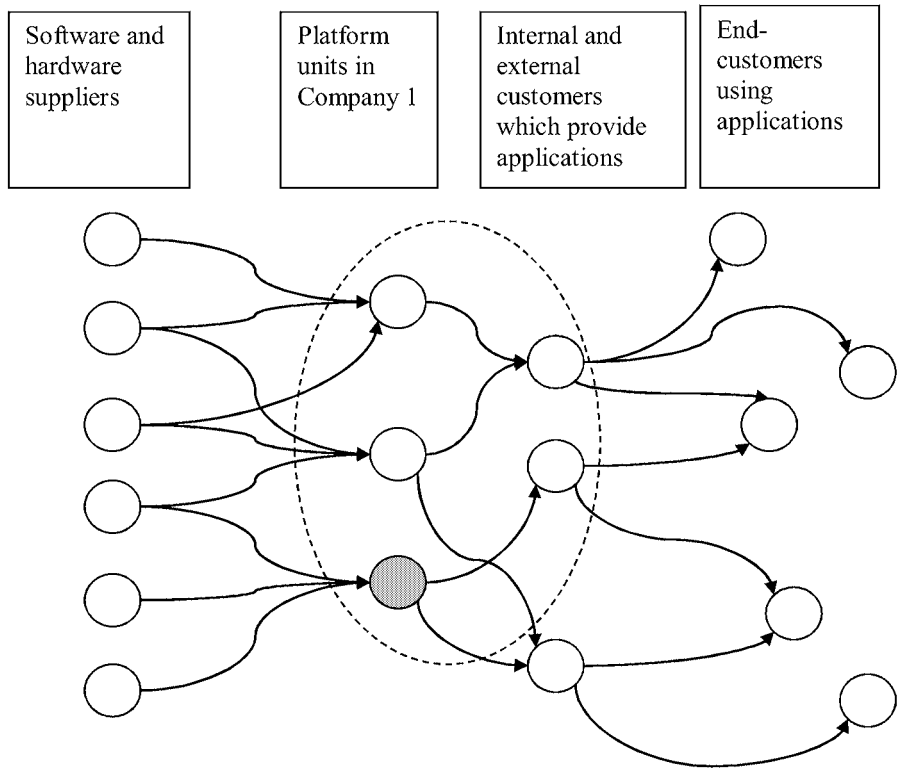
Besides evening out resource need fluctuations, an important reason for collaboration is to gain access to resources inside other companies, which bring variability and complementary competences. That also allows Unit A to allocate its own resources to the core tasks.

Unit A has not made significant changes in its operational environment or internal structure to access resources in other companies.

Broker / closure position

Unit A has relationships with universities and has participated in several research projects (A1). Customers form a certain community, as they are mainly internal (A1). Collaborators are parallel and thus do not interact to a significant extent (A1, A2, A3). Internal clients sell applications built on platforms to external clients (A4, A5).

Figure 23. Structural position of Unit A.



Company 1 is in commanding position in all of its collaborating relationships (A3). In general Company 1 has high negotiation power, and it is a tough contractor (A3).

Unit A is an integrator of hardware and software (A2). In hardware, the management of relationships has been by large on a personal level, even unwritten contracts exist. Trust and personal relationships play a significant role, and problems may emerge if it is unclear what has been agreed on. In general it is a flexible system for hardware development, but problematic as a part of larger picture. (A3) As an integrator Unit A bridges the software community and hardware community. Customers of Unit A are mainly internal (A1). Company 1 has hundreds of collaborators in Finland (A3). Unit A has been working in Finland for a long time, and is using mainly Finnish collaborators in software. In hardware there is a significant amount of foreign collaborators (A2).

Company 1 has hundreds of collaborators in Finland (A3). Unit A has been working in Finland for a long time, and uses mainly Finnish collaborators in software. In hardware there is a significant amount of foreign collaborators (A2). When looking for new subcontractors or partners, a search is first conducted among the companies that have previously had a contract with Company 1, as a contract framework and an assessment of the contractor already might exist. Thus Unit A aims at operating in a closure instead of creating bridges to new communities. (A3) There is no intent to increase the number of collaboration companies (A6).

Company 1 categorizes its collaborators as subcontractors and partners (A1). Partners go through a certain referee process, and they are ones that are remarkable suppliers for a product line (A1). Communication and information exchange with partners differs from the ones with subcontractors (A1). With partners collaboration is wider and includes for example product development, but partners may also carry out similar projects as subcontractors (A1). Partnering relationships are relatively long, and there is no intention to increase the number of them (A1, A3, A6, A4, A5). Subcontracting might be increased in the case of new competence needs or work overload (A3). In hardware supply there is a lot of choice for collaborators, in software there is much less choice, but most suppliers are interchangeable (A1, A2). Software companies are more specialized (A2). Company 1 would prefer a situation where there were larger numbers of interchangeable software suppliers that would compete. A subcontractor with a monopoly over some kind of competence is a hindrance: it has too much bargaining power (A4, A5). However increasing the number of partners would create a more complex interface, which might be difficult to handle (A4, A5). Long-time partnering with the same companies helps to maintain competence and knowledge:

> "Occasionally we have stored competence over personnel shifts, so that we have got a call and they have asked 'can you tell us what we have been working on, we don't know any more as those people left'." (X1, X2)

Collaborators also have been concentrating on a few customers, and have long-term relationships with them (X1, X2, Y1). The incentives to increase the number of customers are securing future, learning new development environments and organic learning (X1, X2, Y1). However subcontractors limit the potential customer base to avoid supplying competing firms, since in that situation there will be borders inside the supplier organization to avoid the disclosure of information (Y1).

The suppliers that are used do not interact to a significant extent. Some of them have relationships to other units in Company 1, which may cause competing interests in the resource usage of units.

Unit A has a limited the number of collaborators, since partnering requires so much more resources that it is not reasonable to divide production into smaller pieces. In hardware production there are more choices of collaborators, in software there are not as many eligible suppliers. When to comes to the supply side, Unit A operates in a closure and network reputation is used when looking for a supplier.

Collaborators may need to limit their collaborating relationships to other companies that are competing with Company 1. This causes internetwork competition.

7.1.4 Standardization and objectivation

Standardization, legislation and other governmental issues are centralized and do not happen in Unit A (A1, A2). Unit A is currently pursuing a modular structure to their product that would simplify interfaces. At the moment, the interfaces in the product are not standardized enough to allow for a pure integrator role for Unit A (A2). A hardware partner provides a whole operating module which includes hardware and low-level software (A3). Providing a whole system allows collaborators to also use the same module with other customers (A3). In software Collaborator 2 plans to develop software modules that could be used with other customers (Y1). That kind of development takes place in software production, mostly due to increased standardization and the and use of open source (Y1).

Unit A produces a technical platform, which is used to build end-products on (A4, A5). Unit A could aim at an increased application base for this platform, which would lead to increased production of platform (A1). At the moment the product Unit A produces is not open platform, but is used by a limited number of clients (A2). The platform combines hardware and software, and the platform ensemble may differ from client to client, so that is possible because of modular hardware (A2). Software modularization is on a lower level for certain reasons, even if there is pressure to increase it:

> "Modularity increases possibilities for tendering, but it is an awfully small part of the whole platform." (A2)

> "The proportion of in-house product development could be still smaller, we would buy more ready-made products, not hours but results. We are interested in off-shelf products and ready-made software. Our role would be one of an integrator." (A2)

> "At the level we are typically operating on, we have to assess very carefully what is important there. So that the maintainability has to be good, but that is often contradicting with reusability or modularity, which on their part are often contradicting with performance or testability. So there are terribly many parameters to cope with when we are designing software, or its architecture, and where the emphasis lays on, what is taken care of first, what then. And all that is done so it is still cost-efficient and an economically sensible action." (X1, X2)

A global standard for computing architecture would create a partnering environment where systems are not customer-specific but rather to allow lower costs and bigger volumes (A3). It is a development in standardizing that affects the whole industry and is likely to increase competition and make it more difficult for companies to differentiate (A1). Company 1 is interested in standardizing as it would lower costs (A2).

In software there is an intention to develop more modular software products. Modularization would simplify interfaces and lower transaction costs. Modularization is difficult because software has been often developed for a certain customer and certain solution, there is an existing framework for which software is developed, and in some cases modular structure would be too complex, slow and uncertain and would not come up with performance requirements. Modularization also gives suppliers the opportunity of selling the same module to other customers and thus lowering the development costs for one customer. At the moment software elements are not modular enough to allow Unit A to be a pure integrator in its core competence area.

The product Unit A is producing is modular in the sense that it can be customized for each client by changing hardware modules. In hardware a global standard for computing architecture is likely to change partnering so that there is less adaptation to customers, cost reductions and increased competition.

7.2 Unit B

Unit B operates in a business area which forms a very significant part of Company 2's service production, IT outsourcing. Unit B produces a large variety of IT services which allow a customer to concentrate on their core competences and improve productivity. Unit B offers also consultation on what parts of IT operations are sensible to outsource, and involve business consulting services to that consultation.

Strategic outsourcing as a business is very competitive. India, China and Eastern Europe all have produced companies that have produced outsourcing services with significantly lower costs. Cost factor is not the only or the most important competing factor, but as customers grow more cost conscious,it can no longer be overlooked. That has lead to collecting software and service packages that require less customization for each industry.

The outsourcing project that the interviews in Unit B were related to is a public project done for a governmental unit. The value of the whole project is over 1 billion dollars, and the system is used in the whole area of a large state. Since the project is very large and has aroused significant local interest it is very important for it to be successful. These issues also cause the project to be riskier than the average project carried out in Unit B. Unit B has certain companies that it is used to collaborate with, and in this kind of large project collaboration is a natural thing to do. Thus this project may represent a larger amount of collaboration and the use of outside resources than other projects in Unit B would do. However the practices, policies and strategies used in this project are not out of line with the common ones in Unit B.

7.2.1 Overcoming transactional uncertainty

Transaction costs

Participating companies have not made significant adaptations in their organization because of collaboration. A representative of Partner V has not perceived any change in their organization structure or areas of competence (V1). However each collaboration project requires certain adaptations especially concerning information systems, information infrastructure and the tools used (V1, Z1). Company 2 has software tools that it has developed. Partner V does not develop these kinds' of tools, but instead develops methodologies and ways of working, that collaborators may employ in their processes (V1). Often the prime contractor has a dominating role in the system and tool choice and the other companies adapt to the prime contractor's suggestions and work their own systems around them (V1, B1, Z1). Companies use a lot of different systems in the support of different customers (Z1).

In long-term relationships, companies have to have competences and individuals that work well together and there must be a clear division of work to avoid friction (V1). Companies also have different vernaculars and that creates a barrier of understanding for inter-organizational communication (Z1). Collaboration makes decision-making more complicated, since you need more consensus building, and partnering adds management layers and decision-making steps (V1, Z1). In this partnership adding even one participant more would mean decision-making to be too complicated to be functional any longer (V1). Collaboration brings in a matrix organization that takes more energy to deal with than a hierarchical organization (Z1).

Overhead collaboration brings in consists of agreements that require care and attention (V1). Additional invoicing, the management of external workers and contract management adds a certain overhead (B1). Collaborators that are not acting as a prime make status reports, they have to follow prime contractors governance structure and the final decision power is with the prime contractor. (B1) Lots of communication is required to make sure that every company has a similar understanding of the project (Z1). Companies operate in an integrated, co-located team (V1, B1). Companies in a project become very dependent on each other. They also limit each other's collaboration space in the bidding and during the project (B1). Building trust is essential for collaboration. Companies have to work for the same goal (Z1).

Transaction costs arise from adaptations that are required for collaboration. Adaptations are in the form of information systems, tools and practices, as the companies have to decide on which company's systems to use. Companies also have to adapt to each other's organizational culture, and build trust. Collaboration increased overhead in terms of contracting and need for meeting and negotiation.

Changes in information transfer

The information transfer in the network is operational and strongly related to the customer project. Since relations between companies tend to be co-opetitive, strategic information is kept internal (B1). However, smaller contractors in particular can be providers of information on the business environment (Z1). When companies are pursuing a deal, information on customers is passed back and forth in order to increase the potential of winning the bid and companies leverage their relationships (B1). In large projects everyone brings their information on e.g. government relations and media to the table (B1). Information on client feedback is passed to collaborators (V1). This information is about sales, business developmental, client expectations and what is going on in general (Z1).

When teaming with Company 2, the other companies tend to use its software tools in information transfer and customer development (V1). In other projects the companies use different tools (V1). The prime contractor dominates when it comes into the choice of information system used (Z1). Client dynamics also have to be included in information system choice (Z1). Companies learn in collaboration, share knowledge and transfer information (B1). The transfer of operational information is essential. Intentional hiding of information on financial matters or timing can even lead to the termination of a relationship (Z1).

As companies are co-opetitive, strategic information is kept secret in collaboration. Information is transferred in order to increase the possibility of winning a bid. Information systems that are used vary from project to project depending on the collaborators and customers, and thus they bring no permanent changes to the information transfer in the network.

7.2.2 Efficiency of network

Cost competition

Collaboration hurts profitability as large collaboration projects have lower margins to retain competitive price (V1). Collaboration is also a budget choice, as partner resources may be cheaper (B1). Collaboration can also be used to gain reduced costs if a collaborator has more purchasing power (Z1). Adding collaborators however increases management overhead and thus its costs and that provides a limit to the possible number of collaborators (B1).

Collaboration is unsuccessful when there are performance problems, a lack of trust or unfitting match of companies (V1). Different values, misreporting of time or finances, misrepresentations in front of clients lead to unsuccessful partnership (Z1). This collaboration has been a very successful fit despite co-opetitive situation, companies have fulfilled their positions very well and they have been capable to solving problems (V1). There is a lot of trust in partners (B1). Most large collaboration projects are successful (Z1). Customer trust is also affected by competitors' projects and their success, thus the success of IT outsourcing companies is intertwined (V1). Also failure of a competitor

causes problems and thus a company's success is dependent on the success of other companies in the industry in a complex way (B1).

> "If Company 2 has problems with projects or Partner V has problems in its projects it actually creates the perception that large IT projects are having difficulties. -- Although we would like to win every time we compete against Company 2, we don't actually wish that Company 2 had problems, it doesn't help us, it actually does it harder for everybody to get business when customers get anxious" (V1)

Cooperation aims at risk sharing, access to complementary skills, leveraging relationships, better competitive position, better purchasing power, and knowledge transfer (B1, Z1). Rich resources and a good reputation are advantages in marketplace (B1), and make a company an attractive partner:

> "Company 2 truly has a wonderful reputation" (B1).

> "Failure may be due to being single-threaded, to not having enough expertise." (Z1)

Collaboration may hinder the competitive power of a company as it may bring competitors access to new customers and make them stronger (V1, B1). On the other hand a company can be more profitable, if it does larger parts of the project itself (B1).

Cost competition has a role, and collaboration decreases profits. However, in some projects it is necessary to collaborate to get all competence and relationships required. Collaboration may in some cases lower costs, as the collaborator's resources may be cheaper. Customers appreciate good reputation and thus price is not the only basis of the competition.

Changing the characteristics of market

Company 2 thinks the future holds more partnering than the past (B1). The main reason for this is risk reduction, as pursuing projects is expensive and the risks in large projects are high (B1). As number of partners increases the management of the project becomes more complex, and thus the number of collaborators is kept to a minimum (B1). Company 2 aims at an increased number of collaborators (B1). Partner V decides collaboration on the basis of business needs, opportunity by opportunity (V1). Partner Z does not aim at increasing number of collaborators, as they have a number of them, including three large providers and several smaller (Z1).

Partner Z has also partnered with Company 2 and Partner V before this project, with another large provider and also with some smaller partners (Z1). Companies often collaborate with the same companies since it gives you an understanding of the capabilities of the partner (Z1). There is a large number of possible collaborators, but in the end only a few that make sense (V1). There is also an inclination to work with the

same combinations that have been successful earlier to replicate the success (V1). The number of partners is limited by the fact that adding a partner adds complexity to project management (B1, Z1).

> The market is quite mature, and Company 2 does not have tools to change it. Companies collaborate to share risk and the collaboration partners change from project to project. That does not lead to any permanent consolidation of relationships, but the co-opetitive nature prevails.

Appearance of intranet competition

Collaborators' competences are broadly overlapping, and thus they compete over same projects and customers. All collaborators suppose that resource wise they could carry out this particular project in-house without any collaborators. However, it would have been unlikely that the bid would have been won without collaboration partners, and thus the team competed against other teams in the project. Teaming up with potential competitors also lowers the risk of losing a bid in another way, as interviewee B1 puts it:

> "The size and complexity of that project … sometimes it is time for some of the strongest competitors to come together."

> "When you partner you take competitors off the street. So your odds of winning go up."

Collaboration of Company 2, Partner V and Partner Z is seldom seen. The reasons are well known in all companies: Companies are in co-opetitive relationships, and they are afraid of losing their competitive advantage if other companies make connections with their client:

> "We do not team with Company 2 very often. As we are each other's largest competitors worldwide now, there is significant overlap in our competence areas" (V1)

> "Collaboration downsides are you make connections for your competitors that they didn't have before, risking to lose customers. You're helping them financially when you add them to your team. You're making the decision not to compete against them, where you might have won -- I don't think any companies have difficulties with partnering with us, other than they feel the same way, why should I help Company 2 to be stronger." (B1)

A point of competition is how to slice the project between collaborators. Companies compete on which one becomes the prime contractor, and how the work is shared:

> "I think Partner V wanted to be the prime contractor and Partner Z wanted to be a prime contractor, and there is a lot of debate when you go to collaborate

about who would be the prime", says interviewee W from Company 2, which eventually became the prime contractor.

Collaborating is also about sharing risks, this particular project is very risky (B1). In this project competitors are collaborating to lower the risk to a tolerable level for each collaborator. Collaboration has been successful this far partly because the participating staff are quite isolated from other projects.

> "Trying to keep the dynamics that follow a partnering relationship out of other relationships" (Z1)

> "We stay focused on this team, this location, and this client" (V1)

Collaboration in this area also temporarily ends competition in similar projects:

> "There would be a natural tension if we were competing against each other in a similar project we're collaborating." (V1)

Companies are competing for the same projects and customers since they have co-opetitive relationships. Companies' have overlapping competences, and specialization areas are not very distinct. Companies ally to lower the risks that are presented as they spend resources on bidding, and thus they compete against other teams.

Allying with competitors is complicated, since companies risk losing the uniqueness of their customer relationships and gain less profit from joint projects. There is also always competition in sharing projects and taking care of customer contacts.

Specialization of companies

Collaboration has not made significant changes to the companies' areas of competence and they still have largely overlapping competences. All three companies claim they could have done the project themselves, but agree on they would have not been as successful alone (V1, B1, Z1). The most desired resource is relationships with customers. (Z1)

Companies pursue projects that are in their area of their expertise. (Z1) Partner V has special resources in design building and the application maintenance, business process outsourcing, human resource outsourcing, financial outsourcing. (V1) Partner Z is strongest in the implementation of health and human services, programmatic knowledge on child welfare, child support, welfare applications, data and data integration (Z1). Companies look for partners who have references, relationships and credentials they do not have by themselves and which would make the team stronger. (V1) Also a better competitive position, better terms and conditions in bidding, better purchasing power, and increased knowledge of customers or users are important. (Z1)

For collaboration companies have to have complementary skills, so that

"Somebody is better at implementation and somebody better at application development, -- or somebody who would has more purchasing power, or maybe you did, or who had a set of skills in a particular area that you might be lacking." (Z1)

Collaboration has not caused companies to specialize their resources. Since there is a lot of competition, companies strive for projects in the areas of their special competence or previous customer relationships.

7.2.3 Access to new knowledge and resources

Enhanced access to other companies' knowledge and resources

Companies have overlapping competences and resources. However the reason for collaboration is the potential of tapping into the resources in other companies. The most wanted resources are competence and relational capital of partner companies (V1, B1). Customer contacts are such desired resources that Partner Z participates only projects which include customer contacts and are not mere subcontracting projects for Partner Z (Z1).

"Company 2 was able to bring together Partner V's track record and Partner Z's more specific expertise on the counties and implementing and converting systems within California. It was a pretty compelling consortium." (V1)

"The benefit of collaboration is a greater access to talent, strengthening the team and your business is your primary driver." (V1)

Even if Company 2 has an abundance of resources in-house covering hardware and software development, their maintenance and consulting, there is still a need for networking (B1):

"The question [that is] often asked is why do you need a partner, and it comes back to, who has the right skills, who has the right political connections, who has the right references, have they done this work before, who will help us win." (B1)

Smaller collaborators appreciate the fact that collaboration allows them to participate in projects that would be too challenging resource-wise for them alone. Collaboration allows them to serve the customer with better resource combination and a single one project does not drain all the resources of a company (Z1). A winning collaboration combination comes from the right combination of skills, political connections, references and good collaboration (B1). Since the project had started the companies become very dependent on the competence and knowledge that had been developed in the project. Partner V is in the middle of application development, and in that area Company 2 and Partner Z are dependent on Partner V (V1).

"The fact that Company 2 can or cannot do certain things or Partner Z can or cannot do certain things is almost insignificant. It is about the people who have been in the project and what they have been doing." (V1)

"[We are] very dependent on collaborators in this scenario in this project, but actually we could have done it ourselves" (B1)

A winning collaboration combination comes from right combination of skills, political connections, references and good collaboration (B1).

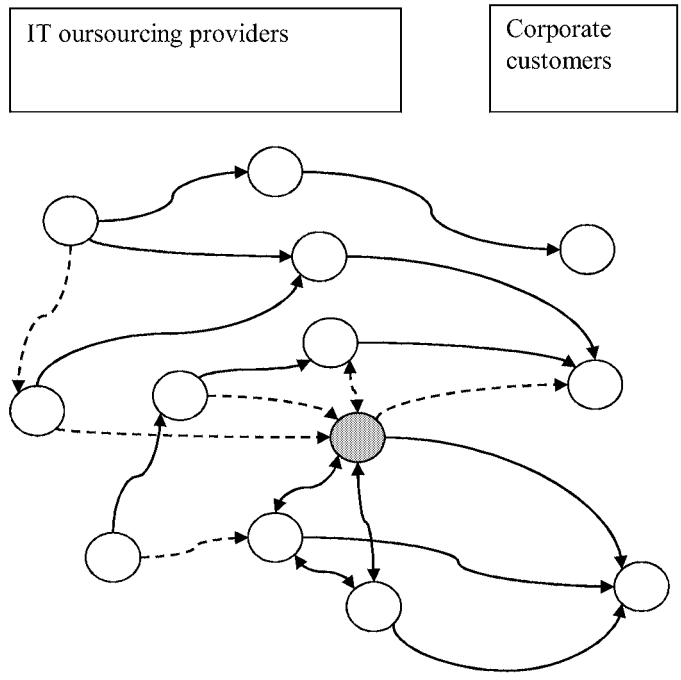
Together companies can come up with better solutions in a very competitive market. The relational capital of companies is one of the most wanted resources that other companies want to access. Collaboration is also carried out in order to share risk and even out resource usage.

Broker / closure position

All collaborators are part of a closely-knit outsourcing business network in the same geographical area. Company 2 is the prime contractor in the project and has 40 percent of the contract and the others both have 30 percent both. However all companies are in contact with the customer. (B1) Company 2 dominates the market in some areas, trailing behind in some others (B1).

There are usually several potential partners, and partnering is an option if the others have a better relationship with the customer (B1). These three companies collaborated earlier as well. Companies know well the competences of other companies and try to pick the best match for each bid (B1). Another company may be in a better competitive position, and that would make it an attractive partner (Z1).

Figure 24. Structural position of Unit B.



Companies are operating in a closure, as there is a closely-knit community. Companies have several companies to choose collaborators on. Companies that have collaborated earlier are more likely to collaborate again, as there is trust, knowledge on the competences other has, and common practices are already tested. Companies, which have relationships outside the closure that the others do not have, may be wanted partners for those relationships.

7.2.4 Standardization and objectivation

Companies do not share automation tools (B1). There are information transfer and design tools that make collaboration easier if they are shared, but they are not obligatory for collaborators (B1). Since Company 2 is the prime contractor in this project, they assume their partners use some of their tools (B1). In some cases collaborators have better tools, in which case companies negotiate which tools to use (B1). Thus the working interface is negotiated for each project separately. Services are non-standardized, and the interfaces between different service providers are thus not clear-cut. The interfaces cannot be totally defined at the beginning of the project, but they require ongoing information transfer. Since interfaces are not standardized collaboration is complex and there is a limit to the number of partners who can efficiently participate so that collaboration would be still efficient and overhead does not become too big.

All collaborators have resources that could have been sufficient to carry out the project. This is a sign that it is by far the most efficient mode of working to carry out most

operations in-house than across organizational boundaries, and thus companies retain all necessary competence to carry out the outsourcing of projects.

Unit 3 does not carry out standardization. Operations between companies are not standardized, and collaboration is complex. Objectivation is not on level that would make interorganizational collaboration efficient.

7.3 Unit C

Company 2 entered the venture capital field at the end of the 1990's. At that stage, Company 2's interest was mostly in software start-ups and the compatibility of their products with Company 2's products. This was at the end of the dotcom boom, and many small companies did not appreciate Company 2's interests. During that time there were other big companies, who were more significant corporate venture capitalists than Company 2. When the IT bubble burst, some corporate venture capitalists left the field. Venture capital investment fell with 82% during the three years following 2000. There was also significant consolidation of venture capital firms.

Company 2 took a different approach to the venture capital community in 2000, and put up Unit C. Unit C is not a main investor in start-ups, but it cooperates with venture capitalists, which are willing to invest in start-ups that are interesting from Company 2's point of view. Previously Company 2 invested in venture capital funds, and did some venture capital investments, but Company 2 has decreased these investments so that they did not compete with venture capitalists. A couple of years ago Company 2 stopped direct investments in start-ups. Company 2 may invest jointly in a start-up with a venture capital partner, if they see that necessary. In the US Unit C reaches 80% of the venture business measured by volume.

Successful venturing also requires assets other than money, and Company 2 realized that. In the venture community there was a pretty good insight into emerging technologies, and on the other hand, Company 2 had use for those technologies. Instead of competing head-to-head with venture capitalists, who know their business better than anyone, Company 2 redesigned its approach to partnering with venture capitalists. The start-ups they invest in may become future partners of Company 2, or Company 2 may overtake them. This strategy has proved more efficient in finding suitable start-ups than previous direct investment. In 2000 Company 2 had 20 partnerships with venture capital funded start-ups. In 2006 the number was 1000.

Unit C is a matrix organization crossing different units of Company 2, and it is responsible for all interactions between Company 2 and venture capital community. Its main task is to accelerate the growth of Company 2 and to work for the acceptance of Company 2's vision, strategies, standards, and architectures in venture capital community. Unit C accelerates innovation and growth in emerging markets, and especially on the standards, technologies and platforms Company 2 uses. The benefits that Unit C brings to Company 2 are channels that can be used to affect emerging technologies, gaining

knowledge on emerging technologies and markets, accessing competence of portfolio companies, and finding collaborators. Unit C works on encouraging start-ups to build on Company 2 framework and thus offers customers better solutions and service. Venture capitalists are invited to join based on their expertise on the technologies that are of interest for Company 2. Venture capitalists also give their suggestions for new products to offer and companies to partner with.

Unit C describes themselves as a strategic concierge service, and the headlights of the company. Venture capitalists and their portfolio companies develop new technologies that Company 2 needs for new markets and products (C2).Unit C works in order to allow Company 2 to establish its position in interesting emerging markets. Company 2 is not able to provide all products and services by itself, and thus there is need for partnerships with smaller companies, which operate those markets. Partnerships mean that the solutions offered to end customers are wider and more complete. They also bring in innovativeness. Sinces it would be difficult for portfolio companies to find suitable partners on its own, Company 2 created Unit C, and utilizes collaboration with venture capitalists to find suitable portfolio companies. For portfolio companies it is an opportunity to reach for big customers, and they gain credibility by partnering with Company 2. Unit C also helps portfolio companies to link with the right people and the right units in Company 2, which is too large for portfolio companies to figure out by themselves.

7.3.1 Overcoming transactional uncertainty

Transaction costs

Collaboration with venture capitalists requires personal interaction and knowledge transfer instead of information systems. Unit C attends venture capitalist meetings and contacts them regularly (C2). For collaboration with portfolio companies, there is no standardized process to follow (C2). Standardizing is difficult, because there is not always a direct or obvious fit for a portfolio company in Company 2's business since they may offer unique solutions (C2). Portfolio companies are also in different stages of their own process and thus have different requirements (C2). With venture capitalists relationships take a long time and a lot of effort to build.

> "It's not just information sharing, we try to make true relationships with the venture capitalists." (C2)

Trust and reputation play a significant role (C2). Since venture capitalists are very busy and do not easily find time for collaboration, they must trust that Company 2 will also work for their best interest.

> "That part is our responsibility to them, they know we're going to help them. So they're willing to try to help us." (C2)

Company 2 does not limit the collaboration possibilities of venture capitalists or portfolio companies (C1). Unit C tries to create commitment by providing value to portfolio companies and communicating the message that the closer they align to Company 2 the more there are value creation opportunities (C1). Portfolio companies are encouraged to use open systems instead of exclusive platforms (C1).

Portfolio companies provide unique solutions, and level of standardization of collaboration is very low. Company 2 builds switching cost in the form of an investment that the relationships require. On the other hand collaboration is not exclusive and does not limit collaboration with other parties. Trust-building plays a significant role due to the high risk of opportunism in the market. Collaboration has decreased the search costs of all parties.

Changes in information transfer

Company 2 has mostly been contributing to information transfer between Company 2 and venture capitalists. That also affects information transfer between Company 2 and the portfolio companies of venture capitalists. Company 2 and venture capitalists have two-day meetings, where venture capitalists present the companies they have in a certain venture fund of theirs (C2). Venture capitalists prefer personal contacts since they have very busy schedules and short attention spans (C1). Electronic communication and formal information sharing does not work very well for them (C1). It is better to bring the topic to them in person (C1). Company 2 informs venture capitalists about the strategies it will implement in the area of those funds (C2).

> "We contact them from time to time, and we see, we get alerts about the funds they are raising, and when we see a match with what they are doing then we go to them and say, here is what we're doing in this area, we're looking for something to leverage what we're doing, and so we'll keep in touch." (C2)

Company 2 also follows the venture funds to spot out potential companies to partner with or to acquire:

> "We watch the funds they are raising, each of the venture funds they are raising, and we look at that, and if we see an opportunity, then one of our team members will actually go connect them." (C2)

Company 2 offers portfolio companies linkages to its corporate units and helps them navigate so they can find the best collaboration parties (C2). For portfolio companies there is a website that works as a provider of information. Venture capitalists do not have such knowledge on the applicability of technologies, customer requirements and potential collaborators that would help them to find the right units themselves:

> "VC's tell us, it could take them a couple of years to randomly come up with the right person in Company 2." (C2)

> "We look at what they have got and where they want to go and we try to use our internal knowledge of Company 2 and in each of these units and we tee up the conversations and introductions with the strategic one, we try to pick up strategic ones." (C2)

Collaboration gives Company 2 visibility to companies with new emerging technologies and in emerging industries and knowledge on what kind of new companies there exist for collaboration and acquisition (C2).

Company 2 has built an information channel to venture capitalists utilizing mostly face-to-face communication. The information transferred is mostly strategic. Company 2 informs venture capitalists of its technology strategy and its future needs and venture capitalists provide information about portfolio companies they have on those areas. That allows portfolio companies to find collaboration units inside Company 2.

Unit C performs an important brokering function between portfolio companies and their potential customers, and changes the information transfer between those companies completely.

7.3.2 Efficiency of network

Cost competition

Since the returns that Unit C gains come through other units in Company 2, it is successful when it created the right connections to other units, new technologies, industries and applications (C1). This brings organic growth to Company 2:

> "These are potentially new markets, new businesses, new opportunities created by venture capital investments and the companies' specific ability and then to link that to Company 2's breadth and reputation and brand to leverage that Company 2 could have a good market strategy. Where the venture capital start-ups have the technology, they do not have the reliability to go to the market." (C2)

Unit C has put a lot of effort into building up a working network of venture capitalists, which is a key to its success.

> "Early on, when we started seven years ago, they weren't much interested in spending a lot of time with us. Especially because money was coming quickly and they weren't sure what value it would bring as we were not adding money to their funds. -- It took a little while for them to really understand that financial value of that relationship. We have shown we have been responsible and really delivered what would give them a crack in the market place." (C1)

As a result of collaboration with venture-backed companies Company 2 has acquired collaborators in key areas to a significant extent and thus increased its competence (C1).

Thus the value that venture capitalists bring to Company 2 is not only in the intangible form of insights and expertise but also in the portfolio companies they bring in (C1).

Crucial as a source of competitive advantage is combining new resources, portfolio companies, to existing ones, brand and customer base. Venture capitalists gain a competitive advantage since their portfolio companies are more successful and thus give better returns. The success of different parties is interdependent. In collaboration the costs are not as significant as the competence that is accessed.

Changing the characteristics of a market

Company 2 is investing into the venture capital community. Company 2 provides venture capitalists unique access to its resources and its customer base (C1). Company 2 also tries to have an influence on the development of emerging technologies and markets by opening up its technology strategy so that venture capitalists and their portfolio companies can align their strategic focus accordingly (C1). Company 2 and venture capitalists have a symbiotic relationship that brings value to both (C1). Venture capitalists also have relationships with each other, and they form financial syndicates together (C1). However Company 2 pulls them together for special issues and industries like clean tech or healthcare (C1). Company 2 helps other companies take opportunities by putting resources in (C1).

Company 2 influences emerging industries and technologies by communicating its strategy and offering venture-backed companies access to its customer base. Company 2 has had an effect on the venture capital community and has built bridges between industries.

Appearance of intranet competition

Portfolio companies compete for funding, and venture capitalists compete against each other. Company 2's units compete against different firms. Unit C as a corporate venture model is quite unique, and it has no direct competition (C1). Company 2 had used to have venture capital operations itself, but gave them up as they realized that it was not their core competence and thus does not work very well (C2). The operations in Unit C are unique since as there are no other companies that invest their customer base for venture-backed companies (C2). There are no direct competitors forthis unit, but their competitors are the competitors of Company 2 (C1).

Company 2 tries to maximize their partner's possibilities, and thus when collaborating with any particular portfolio company, Company 2 does not create competing applications of its own (C1). Portfolio companies are encouraged to work with open systems and there is nothing exclusive in the collaboration (C1).

There is very little intra-network competition that would involve Company 2, however venture capital companies compete against each other. Venture capital companies and Company 2 have vested interests. Company 2 does not compete against portfolio companies either, since it does not provide applications in the same areas as portfolio companies, but they complete Company 2's solutions. There are no other companies that can offer the connections that Company 2 can.

Specialization of companies

Collaboration works as a way to fit the unique needs and competences of Company 2 with the ones of venture capitalists (C2).

> "It would be a more centralized process, if everything was directed from the venture community and the portfolio companies. So we [would] just add another connector to our thing, you know they make a plug-in to [our platform]. It's not like that. These guys are looking for unique solutions to make them unique in the whole marketplace."

Company 2 very carefully selects the venture capitalists it collaborates with. Venture capitalists that are very small, who are not investing in breakthrough technologies or new thinking are not seen as potential collaborators (C1). The selected collaborating venture capitalists are reached regularly, and then there is a broad base of venture capitalists that are monitored (C1). Most of the good deals come from the very top tier of the venture capitalists, and thus it is not necessary to work with a broad range of venture capitalists to find the best new companies (C1). Company 2 selects the collaborating venture capitalists based on the area where new technology or competence is needed; whether the selection criteria are geography, technology or industry. Then the search is narrowed down to include most potential collaborators (C1).

Companies have specialized roles. Company 2 selects in each technology area the most promising venture capitalists to collaborate with so that there is not any unnecessary overlap. For portfolio companies the most suitable niche is sought. Company 2 has special resources in its technological know-how and customer base.

7.3.3 Access to new knowledge and resources

Enhanced access to other companies' knowledge and resources

Unit C's role is to facilitate and provide information (C2). The goal is to improve the access of portfolio companies to potential collaborators and customers, and on the other hand enhance the access of Company 2's other units to the resources of portfolio companies to serve customers with better solutions (C2).

> "We look to nurture these companies since they come to us and we say, hey those are interesting, take them into IDR program or partner program, and when they're in our partner program we offer them sales leads." (C2)

Company 2 offers the portfolio companies access to technical enablement, partner programs, access to technology, and resources in Company 2, but most importantly to the customer base (C2).

> "We're investing our customer base. So wherever we have a customer base where we're looking for growth, if we see an opportunity for a start-up to emerge in that particular area, and we could achieve more growth, that's exactly what we're looking for." (C2)

The benefit that venture capitalists get out of collaboration comes from the success of portfolio companies. Portfolio companies need a big partner to have credibility in the market place, to get access to customers (C1). Company 2 can access through that collaboration the knowledge and competence of venture capitalists for the portfolio companies (C1). Company 2 benefits from the insight that the venture capitalists have about the emerging businesses and firms (C1). Venture capitalists work as pre-selectors of potential collaborators for Company 2 (C1).

> "Where they are investing gives us kind of the headlights, as to where they see new opportunities." (C1)

The most important resource Company 2 offers to its collaborators is its customer base. Other resources portfolio companies access are technology and research facilities. Venture capitalists access Company 2's knowledge on technological development. Company 2 accesses venture capitalists' portfolio companies that are potential collaborators, and thus it has better access to new knowledge and new products.

Broker / closure position

The director of Unit C meets with the top 100 venture capitalists every year and creates relationships with them (C2). There is a selected group that are collaborated with, and a broader base is watched (C1). Working with the top companies actually provides access to a broad range of portfolio companies as venture capitalists collaborate in funding (C1):

> "Another interesting thing in the venture capital community is that investments most often are not made by individual venture capitalists. A lot of the very smart deals are seen by the very top tier with whom we have good relationships. You don't have to work with all of them to get the best companies." (C1)

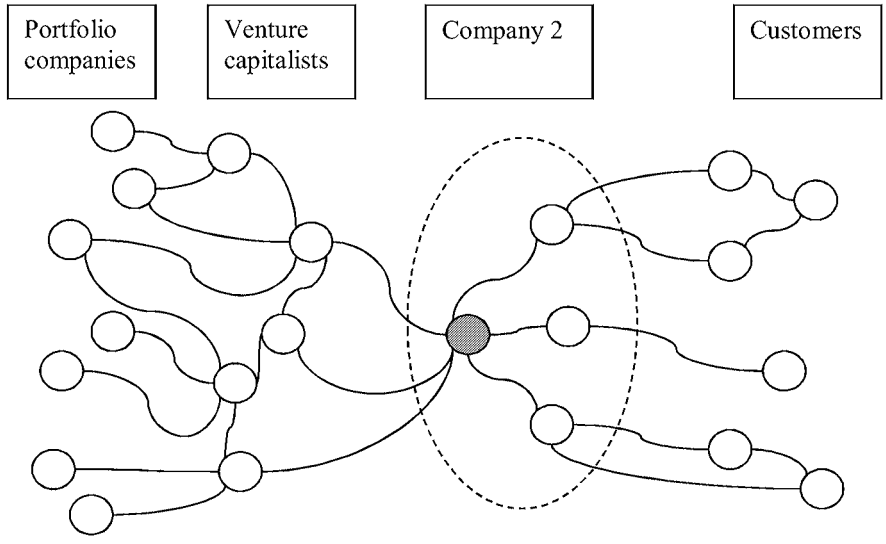
When looking for new collaborators in a given area, the most competent venture capitalists in that area are sought in a wide search. The number is then narrowed down to allow for a more intimate relationship with the most promising ones (C1). New

collaborators are sought when new technology is needed (C2). Certain collaboration activities, like meetings and sending out newsletters, reach a very large number of venture capitalists. However, when looking for collaboration in a certain area of technology, the venture capitalists with whom Company 2 interacts is narrowed down (C1).

Each year the top 100 venture capitalists are met with (C2). During the last two years Company 2 has acquired 1200 venture-backed companies they have collaborated with (C1). The number of collaborators is now at a suitable level and there is no intention to increase this number even though there will be new areas, and relationships evolve over time (C1). Current collaborating venture capitalists offer a good view on emerging businesses and technologies, and bring new portfolio companies and opportunities in that way (C1).

> "We have been in that business for almost seven years, and I think we have a pretty rich and comprehensive list of collaborators. We are always working on deepening those relationships and get to know more of the partners within those firms that specialize on certain areas."(C1)

Figure 25. Structural position of Unit C.



The portfolio companies and their potential customers operate across multiple industries varying from software production and servers to healthcare (C2). Company 2 operates widely on the information technology field and thus the collaboration with venture capitalists happens on the wide scale (C1). As Company 2 operates in all these fields and also with venture capitalists and their portfolio companies that it brings together with customers, it is operating in several markets (C1).

Company 2 acts as an intermediary between the venture capitalist community, portfolio companies and the customer base spreading onto several markets. Among venture capitalists Company 2 has a wide reach as it works with the top companies that have a lot of linkages inside the venture community. In the venture capital community Company 2 is interacting and collaborating with a significant number of companies.

The venture capital community including Company 2 form a closure, as venture capitalists often collaborate. Venture capitalists perform a search function for finding new portfolio companies, and they create ties that sometimes bridge to new clusters. Company 2 brokers between venture capitalists, portfolio companies and potential customers. Company 2 has formed relationships with the potential customers for portfolio companies, and has trust and a good reputation on the marketplace.

The market Company 2 acts in is truly N-sided, as it includes different industries.

7.3.4 Standardization and objectivation

Unit C is describes themselves as a strategic concierge services, and as the headlights of the company. Venture capitalists and their portfolio companies develop new technologies that Company 2 needs for new markets and products (C2). The platform of Company 2 is in the form of the assets it has built to let companies to gain access to Company 2's customer base:

> "Without investing dollars, giving technical enablement, partner programs, access to technology, and resources in Company 2 and getting them into the partner programs and taking them to the market." (C1)

The assets Company 2 has developed are trustful relationships with venture capitalists and processes for portfolio companies. The assets which once belonged to Company 2 and are now shared with other companies are technology, technology development and research facilities, and most importantly the customer base.

Company 2 has built resources that allow other companies to access its customer base and other resources. Company 2 has objectified its knowledge of technology development and customers, but most of that knowledge is tacit and forms Company 2's competitive advantage, and thus it is not objectified.

8 FINDINGS

In this chapter each unit is analyzed based on the framework built in chapter 5. First a unit is evaluated based on the level of standardization and degree of tacitness in order to find the network type against which it is discussed. The discussion is divided into topics of transactional uncertainty, efficiency of network, and access to new knowledge and resources. By the end of the chapter a theoretical framework is complemented based on the findings.

8.1 UNIT A

Standardization and tacitness

Unit A sources services that are mostly non-standardized. Unit A would like to buy more standardized services, and that would mean buying pre-defined software modules instead of software development services. Standardized interfaces and modular structure would allow it to act as an integrator, and concentrate its resources in areas that they feel represent their core competences. Modular structure would allow bidding among software suppliers, and cost efficiencies in that way. In the industry there is an increased interest in standardization, the use of open source and the purchasing of integrated hardware and software modules. However, these goals are difficult to pursue because of certain reasons. These reasons are the difficulty of building modular software that would be efficient, since modular structure increases overhead and may reduce performance, and that challenge to integrate modular software in existing product, which has been built for decades on different logic.

The product that Unit A is producing is a platform that operates as the basis for several applications. However, it is not an open platform that would allow any company or user to build their own applications on that platform. Thus it cannot be used by network members as a set of solutions based on tacit knowledge. The platform is however a result of making tacit knowledge explicit and combining it into this product. The companies also need to share technological and organizational knowledge when collaborating. This knowledge is objectified in the process in order to allow for the sharing and combination of that knowledge. Software specifications and a result of objectifying knowledge, and technical tools shared are also results of objectifying the technological knowledge that Unit A possesses. Thus the transactions include a significant amount of explicit knowledge, which is in the form of software and its specifications.

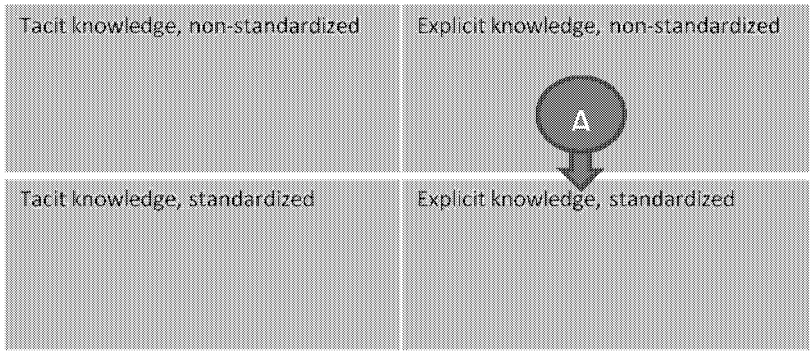


Figure 26. Standardization - tacitness of Unit A.

Overcoming transactional uncertainty

The knowledge that is created in collaboration is in the explicit form of software code. However there are still parts of knowledge transfer that are tacit, but the tacitness of knowledge is reduced by objectivation. Collaboration requires shared tools, which means collaborators copy the development environment of Company 1 in their organizations. Companies also use common procedures of product development. There is competence transfer between companies, which leads to shared technological and organizational knowledge in those companies.

There is also transactional uncertainty which arises from information asymmetries, mostly because of the intangibility of the product. Intangibility causes a need to specify the service bought in detail, and those specifications have to be in contracts as well. Thus there are high contracting costs. To avoid contracting costs Company 1 prefers to use the same contractors it has used before. Using a completely new collaborator requires an extensive process of evaluation. Using companies that they have worked with earlier is also reasonable because there is trust that allows them to cope with transactional uncertainty: Each detail does not have to be in the contracts and collaborators work for the best of the project.

In the industry the level of standardization is still pretty low. In hardware development standardization is done on a broad front. In software there are developments towards increased modularization, but there are certain aspects of modularization that make it difficult. However, the modularization and software products that can be sold to several customers would decrease transactional uncertainties as products would be pre-defined. Because the level of modularization is not especially high and the interfaces are not standardized, there is a need for frequent knowledge and information transfer between companies.

Company 1 avoids the risk of opportunism by avoiding situations where co-opetition is present. Co-opetitive relationships are seen as threats since there is always a possibility of disclosures.

Collaboration companies tend to have overlapping competences because of a lack of standardized interfaces and tacitness of knowledge. If competences did not overlap at all they would not speak the same language and there would be too high information asymmetries to even define product specifications.

Table 15. Overcoming transactional uncertainty in Unit A.

Transactional uncertainty	Assumption	Unit A
	Information asymmetries increase transactional uncertainty	The intangibility of the product causes information asymmetries.
	Information asymmetries act as an isolating mechanism protecting the source of competitive advantage from imitation	The risk of imitation is avoided by avoiding co-opetitive situations.
	Standardization reduces information asymmetries especially from the client point of view.	There is an attempt to increase modularization. Modularization is still at a low level. Interfaces are not standardized, and the platform is not open.
	Trust reduces opportunism	Trust lowers contracting costs that are otherwise high because of the intangibility of the product. Trust reduces the risk of opportunism.
	Closure is an efficient production system	The same contractors are used again and again to avoid transaction costs.
	Information asymmetry also represents itself so that a client may have the knowledge and information needed, that is the situation in co-productive relationships	Client has a significant amount of the needed knowledge, and that knowledge is necessary for product specifications. Competence overlap is necessary as interfaces are ill-defined.
	Objectification is aided by shared language and tools, common procedures, shared technical and organizational knowledge, long-term relationships and shared collaboration codes	Collaboration requires shared tools, companies use common procedures and competence transfer leads to shared technological and organizational knowledge in companies.
	The risk of imitation increases when knowledge is objectificated	The risk of imitation is not especially high as long as the product is non-standardized.

Assumed and found

Based on the theoretical framework, the low level of standardization means that there is transactional uncertainty in the relationship. Transactional uncertainty is slightly reduced because of the explicit knowledge products that are transferred. Since Unit A faces the price pressure and a reason for sourcing services is to reduce costs, it is assumed that it is operating in a closure. Closure is an efficient production system, as the same collaborators are used again and again to lower transaction costs. Closure is also more price-efficient than a network with structural holes, as closure is more like a market.

Information asymmetries lead to the situation where the customer has knowledge and information that is needed to produce the service. For Unit A it is the low level of standardization that causes that there is a need for significant amount of customer input before service sourcing partners can deliver their service.

Since companies want to objectify knowledge to lower the transaction costs of collaboration, they can facilitate objectivation by sharing technical and organizational knowledge. This is also visible in Unit A's supply relationships, as collaborators share a large amount of technical and organizational knowledge. Collaboration requires shared tools, procedures and competence transfer.

What is new?

Transactional uncertainty causes a need for long-term relationships, where companies can create trust and thus protect themselves from opportunism. Long-term relationships are visible in Unit A's transactions, as assumed. However Unit A does not find long-term relationships to be a sufficient safeguard against opportunism, but it avoids risk of opportunism by not committing to co-opetitive relationships. Even the suppliers have limited possibilities of collaborating with competitors. The risk of imitation should not be especially high as the service products that are supplied are not standardized, but it is obvious that Unit A is afraid of leakages of knowledge which has been made explicit in transactions. Unit A is also careful with suppliers that are potential targets of takeover by a competitor, as that would lead to a co-opetitive relationship and in the worst case a dependence on a competitor's competence.

Based on the theoretical framework, Unit A should gain benefits from enabling the flow of information and knowledge in its supply network. However Unit A is not building any network resources to enable that kind of flows.

Transactional uncertainty arises from the intangibility of the products sourced and the low standardization of interfaces. The transactional uncertainty that is derived from them means that sourcing requires a large competence overlap to be successful. Standardization would reduce information asymmetries and thus decreases the potential for opportunism. Purchasing standard service deliveries, e.g. software modules, says very little to competitors about ongoing product development in Unit . Thus who-supplies-to-whom would lose its significance, and make it possible to choose from a larger supplier base.

Software development services are an industry area which is undergoing a transformation from services to more goods-like products. That development is driven by the pressure to reduce transaction costs and to increase the efficiency of markets. However the features of software development make that development difficult and a slow industry development.

Efficiency of network

Since cost competition has increased in the industry, there is also pressure to lower costs down for knowledge-intensive service provision. Until now, other things have still been more important factors than costs. Since Unit A is producing an old product its development costs of it are relatively low and subcontracting is used mostly to even out resource fluctuations and keep fixed costs low.

There is such a low amount of standardization in software production that cost competition is not very efficient. Managers in Unit A recognize that if software production became more standardized it would make software production cheaper. That would lessen the specialization and adaptation of companies and make transaction costs, such as search costs and contracting costs, lower.

Companies increase the performance of relationships by adaptations. Adaptations make the processes work smoothly across company boundaries. The trust that is developed makes it possible to increase efficiency because production is more flexible. Frequent information and knowledge transfer is necessary for collaboration, since the subcontracted components are tightly interwoven with the product, and the interfaces are not standardized.

Table 16. Efficiency of network in Unit A.

Efficiency of network	Assumption	Unit A
	Cost of knowledge transfer defines what operations are done in-house	
	KIBS may increase their delivery performance with a certain client with adaptations	The performance of relationships is increased by adaptations. Adaptations and trust allow flexible production in a certain relationship.
	Cost competition in KIBS is rare, but the low level of tacitness increases cost competition	The level of standardization is so low that cost competition is not very efficient, even though large parts of the knowledge that is transferred is explicit.
	A lack of standardization causes information asymmetries especially from the customers point of view	

Assumed and found

Unit A tries to reduce product development costs by sourcing software development services. Since service transactions contain transactional uncertainty because of the low level of standardization, and objectivation of knowledge is possible only by extensive competence transfer and competence overlap, sourcing requires long-term relationships. Thus switching service provider or multi-sourcing is not convenient, and suppliers cannot be chosen purely on a cost-basis. Unit A pursues lower costs by increasing delivery performance with adaptations and trust-building, which reduces transaction costs and provides flexibility. Reduced transaction costs and flexibility are intertwined, as the flexibility of suppliers is presented e.g. in starting to work with a customer project before the formal contract is finalized.

As theoretical framework suggests, cost competition is not fully used among suppliers, but standardization would change the situation. Standardization would drive cost-based competition as it would reduce the uncertainty that the customer perceives.

What is new?

Case Unit A suggests that standardization and tacitness are interlinked in software development in an interesting way. Standardization and the tacitness of transferred knowledge meet in modularization. For Unit A to be able to define the product it develops as modules would require extensive objectivation work. To build a modular architecture it needs to define standard interfaces between modules before purchasing any of them.

Unit A demonstrates that if the level of standardization is low, the sole explicitness of the knowledge transferred does not make cost competition efficient. This suggests that services sourcing is not a very efficient way to reduce costs as long as either a low level of standardization or tacit transferred knowledge is present.

Access to new knowledge and resources

Unit A does not use networks to gain significant new knowledge that would matter for innovations. The competences they bring together are specialized to some extent, but there is competence overlap and Unit A wants to maintain that competence overlap in order to avoid the loss of some development areas. Knowledge that is sought completes the existing knowledge of Unit A, and there is no need for radical innovations.

Due to the lack of standardization and the need for the relationship-specific assets that it causes, short-time partnering is not possible, and that limits the manageable number of partners, since overhead increases with each partner and hinders the possibility to maintain weak ties. Company 1 is in a central position, and thus there is a possibility of reaching reach new knowledge. However Unit A operates in a closure because it aims at efficient production, and closure lowers transaction costs. Unit A has outsourced its activities, and that has caused an increase in new knowledge-intensive service providers. Outsourced services have developed their competences and thus outsourcing has created the ability to reach more varying competences than it can rely on in-house.

Table 17. Access to new knowledge and resources in Unit A.

Access to new knowledge and resources	Assumption	Unit A
	The potential for innovation is low, as a lack of standardization causes a need for competence overlap.	Knowledge and competence largely overlaps.
	Networks can be used to search new knowledge	Knowledge sought complements and overlaps existing knowledge and is not new in that sense.
	Weak ties are important for learning	Short-time partnering is not possible due to transaction costs and thus companies cannot utilize learning through weak ties.
	A central position in a network allows for being in the nexus of innovation	Company 1 is in a central position, and it would be possible to achieve new knowledge, but does not exploit it as closure is a more efficient production system.
	Innovation requires accessing external resources	

Assumed and found

Unit A does not primarily use its service supplier network to increase its innovation potential, but to decrease costs and balance work load. Thus it is not surprising that collaboration is not combining different knowledge sets. Competence overlap is very broad, but there are some areas in which Unit A no longer has the competence to produce, and suppliers have developed that competence further. Thus Unit A can source better software development competence than it can maintain itself.

A structural hole position would allow access to knowledge and competence which would increase innovation potential, but since Unit A is aims at cost efficiencies, there is no pursuit of a structural hole position.

What is new?

Even though there is cost competition and increased pressure for more standardized services, changing suppliers is still too difficult and costly to allow short-time partnering. Relationships are long-term, require trust and competence transfer, and therefore maintaining weak ties would be difficult. Thus collaboration is not favorable for learning, since learning also requires weak ties.

Company 1 is in a central position in its network. However Unit A does not utilize the possibility of reaching networks other than the closure in which it works. This suggests that a central position itself is not enough to make pursuing innovation lucrative.

8.2 UNIT B

Standardization and tacitness

In this case, services are non-standardized, and the interfaces between different service providers are not clear-cut. The interfaces cannot be totally defined at the beginning of the project, but they require ongoing information transfer. Since interfaces are not standardized, collaboration is complex and there is a limit to the number of partners who can efficiently participate so that collaboration is still efficient and overhead is not too big.

In each collaboration project, companies choose which tools they use for information and knowledge transfer. The prime company has most of the power to decide which tools are used, and it often makes collaborators to use its own tools and environments. Collaborators may have better systems, and thus they are occasionally chosen. Thus for each collaboration project companies negotiate and create a new way of transferring information and knowledge.

All collaborators have resources that may have been sufficient to carry out the project. This is a sign that it is more efficient to carry out most operations in-house rather than across organizational boundaries, and thus companies retain all necessary competence to carry out outsourcing projects. The knowledge created is in the form of software code. Tacit knowledge is transferred and created in the product specification phase. Companies do not collaborate in order to create tacit knowledge and they do not transfer mainly tacit knowledge.

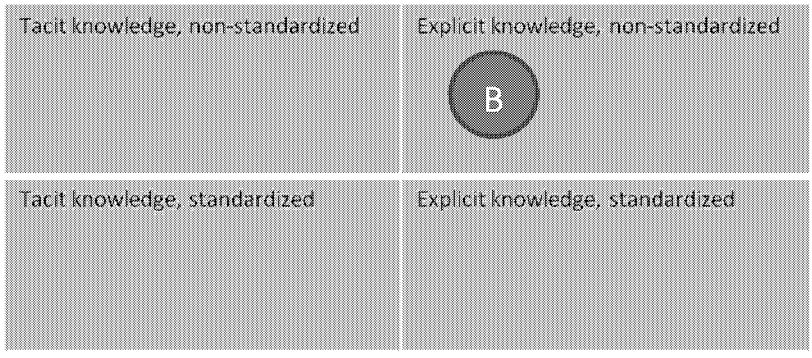


Figure 27. Standardization - tacitness of Unit B.

Overcoming transactional uncertainty

The knowledge that makes a difference between companies is often customer-related, since companies are not very specialized and thus there are several companies with similar technical and knowledge resources competing for same customers. When allying with a competitor companies risk losing the uniqueness of their customer relationships. Customer-related knowledge is transferred between companies only in the situation where companies are bidding in a team. Knowledge is transferred in order to win bid and to serve a customer better. Since companies are in co-opetitive relationships they are not eager for other companies to become acquainted with their customers. However, in

collaboration trust is an essential factor. Companies have to close their minds to the other operations and projects where their companies may be competing, and create an environment that neglects opportunism. Collaboration requires plenty of information transfer. That is facilitated by the co-location of the team. During collaboration projects companies are very dependent on their partners' competences and on the knowledge that is created during the project.

Companies operate in a closure. That is beneficial as companies have several potential collaborators. Companies also have a good knowledge of the competences that other companies have, and that lowers search costs when looking for a partner. If companies have worked together earlier, they try to replicate good experiences by working with the same partners again and again. Competences have to be complementary, and the communication styles of all partners have to fit.

Table 18. Overcoming transactional uncertainty in Unit B.

Transactional uncertainty	Assumed	Unit B
	Information asymmetries increase transactional uncertainty	There are no significant information asymmetries concerning the competences of other companies. However there are information asymmetries concerning customer information and relationships, and they make a difference.
	Information asymmetries act as an isolating mechanism protecting the source of competitive advantage from imitation	Information asymmetries protect the source of competitive advantage, and companies avoid removal of those asymmetries. Relationships are co-opetitive, and there is a risk of opportunism. Companies avoid opportunistic behavior by developing trust.
	Standardization reduces information asymmetries especially from the client point of view.	The standardization of interfaces would reduce information asymmetries, which are still present. Information asymmetries definitely provide negotiation power to the party with more knowledge.
	Trust reduces opportunism	Trust is essential in collaboration to reduce the risk of opportunism. The flow of information and knowledge is not affected at the network level, in individual relationships it is facilitated by the co-location of personnel.
	Closure is an efficient production system	Companies operate in a closure. Companies have several potential collaborators, and a good knowledge

		of the competences of potential partners.
	Information asymmetry represents itself so that a client may also have the knowledge and information needed, that is the situation in co-productive relationships	Information asymmetry is a reason for the complex governance of projects and high transaction costs.
	Objectification is aided with shared language and tools, common procedures, shared technical and organizational knowledge, long-term relationships and a shared collaboration code	Companies tend to collaborate with companies that have similar company cultures, and with whom they share technical knowledge and tools, have common procedures and long-term relationships.
	The risk of imitation increases when knowledge is objectificated	Companies objectivate only the knowledge that is essential to serve the current customer. Companies are not eager to objectivate customer-related knowledge as it is a source of competitive advantage and also costly to objectivate.

Assumed and found

As was assumed based on the theoretical framework, companies are unwilling to reduce information asymmetries in those areas of knowledge, which bring a competitive advantage. Companies are willing to objectivate the technical knowledge that enables more efficient production by reducing transaction costs. Objectivation is enabled by similar company cultures, shared technological and organizational knowledge, common procedures and long-term relationships between companies. Companies also find company culture similarity to be an important factor when selecting potential collaboration partners. Relationships are co-opetitive, and thus companies see a potential for opportunism. Trust-building has decreased the fear of opportunism, and working in a closure also reduces the risk of opportunism. Closure is an efficient production system, and companies can choose collaborators from several potential companies.

What is new?

There are surprisingly low information asymmetries between companies. Companies collaborate even though they have overlapping competences. The most important difference is customer relations and customer knowledge. The importance of customer contacts is also manifested in the fact that all companies insist on having direct contacts with customer instead of just subcontracting with prime. Companies with customer relationships and customer knowledge try to maintain these information asymmetries, as they bring them competitive advantage.

Companies do not intend to facilitate the information and knowledge flows in the network, even though that could increase efficiency of the whole network. That may be due to co-opetitive relationships, and a significant competence overlap that facilitates collaboration.

Even though collaboration produces explicit knowledge, it seems that a mere lack of standardization makes collaboration very complex and transaction costs high. The intangibility of a product, a lack of standardization of interfaces, and transactional uncertainty that arise as a result means that no more than three collaborators can be involved since overhead increases with every collaborator.

Efficiency of network

Costs are not the most important issue in competition, but it has a role, since there are several companies who can supply a certain system. Thus the price has to be competitive, even since issues like reputation, competence and relationship capital matter are the aspects that differentiate companies from each other. Customers have low search costs and in large projects they know which companies are able to bid on each project.

Collaboration may have varying effects on the profitability of a company. If a company has cheap resources or other features that provide cost-efficiency, partnering with such a company may bring down the costs for the others. However, collaboration always brings an overhead that causes costs that directly hurt profits. Collaboration is also a way to lower risks in the tight competitive situation. Collaboration decreases the risks of bidding, since a company does put as much resources into the bidding process, and since all companies also competing against each other, collaboration takes a potential competitor out of the competition. In project execution, a smaller share of a company's resources are tied to one project, and thus the company can participate in a larger number of projects and thus safeguard against risks. Companies adapt to each other by using the same information systems during collaboration. Companies in a good negotiation position, like Company 2, make less adaptations than other companies. Adaptations make collaboration more efficient, but they are not permanent. An adaptation that makes collaboration more efficient is the co-location of staff. Companies have overlapping competences, and they have to negotiate the shares that each company has on the project. Interaction with the customer is more important that the percent of the project they control and more important than the expected financial outcome.

Table 19. Efficiency of network in Unit B.

Efficiency of network	Assumption	Unit B
	Costs of knowledge transfer defines which operations are done in-house	Cost of knowledge transfer is a reason to why collaboration with several companies would be too complex.

	KIBS may increase their delivery performance for a certain client with adaptations to the client.	Companies adapt to each other by using the same information systems during the collaboration project. The prime contractor does less adaptations than do the subcontractors.
	Cost competition in KIBS is rare, but the low level of tacitness increases cost competition.	The price has to be competitive. There are several companies competing for each project, and they have similar competences. The service offering can be regarded as standard, even though the industry is not very standardized.
	A lack of standardization causes information asymmetries especially from the customer's point of view.	Customers have a good knowledge of the competences of each company.

The cost of knowledge transfer is, according to the theoretical framework, affects the make-or-buy decisions of companies. However in this section, where knowledge is mostly explicit, it is no longer considered to be significant. In Unit B transaction costs arises when a lack of standardization causes an overhead to inter-organizational collaboration and is a reason why it is not reasonable to divide work between many parties.

Companies operate under price pressure. There are several companies competing for the same customers, and their competences are mostly similar. Thus collaboration does not bring sufficient overhead to production, otherwise companies are likely to lose their competitive edge. Companies try to overcome the transaction costs by making adaptations that increase performance in relationships. A lack of standardization causes a complex interface, and thus collaboration requires the adaptation and management of the interface needs a lot of resources.

What is new?

A lack of standardization also increases overhead of collaboration, and is a significant factor in a make-or-buy decision. The lack of standardization causes companies to have to work in close collaboration that resembles co-production rather than subcontracting.

In the case of Unit B it is surprising that even though the industry is not very standardized, the cost of competition plays a significant role. That suggests standardization is not the only factor to lower costs in service industries, but e.g. competence similarity may be a factor.

Access to new knowledge and resources

Since collaboration requires a lot of resources, it is not possible to have several collaborators in a project. Company 2 has used several partners, but they tend to come

back to the ones that were easy to collaborate with. So there is not a large number of collaborators at a time. That means the number of collaborators who contribute to the knowledge base is limited and there are no weak ties to bring into learning. However, since companies work in a closure there is not very much new information or knowledge that can be reached by networking. Companies also tend to collaborate with the same companies again and again, as their company cultures and competences fit with each other. Company 2 is in a good position, as many companies are willing to collaborate with it due to its good reputation. Thus network reputation lowers search costs and the need for trust-building in Unit B.

Companies collaborate to gain access to resources, to competence and customer contacts. Companies all want to get customer contacts and it is important in each project to have customer contact instead of subcontracting with some other companies. The information systems that are often used are often the ones that the prime uses. Information transfer tools make collaboration easier, but they are not sufficient for coordination. Therefore collaborators operate in co-located teams which makes daily information transfer easy.

The competences that companies bring together are largely overlapping. That makes collaboration easier, as companies are aware what competencies they lack and can search for them. Partner V had good network reputation and in some technological areas, and Partner Z had special customer-related expertise. Company 2 instead had a wide resource-base and good reputation. Together they were a credible combination. However they did not have especially different knowledge bases, but most of their competences were similar.

Table 20. Access to new knowledge and resources in Unit B.

Access to new knowledge and resources	Assumption	Unit B
	Potential for innovation is low, as lack of standardization causes a need for competence overlap.	Companies have overlapping competences, and collaboration is motivated by the possibility of combining knowledge from different sources.
	Networks can be used to search for new knowledge	Networking is not used to access new knowledge, and knowledge is not moving effectively in network. Companies have quite similar knowledge bases.
	Weak ties are important for learning	The maintenance of weak ties is costly, and companies tend to have strong ties to certain companies.
	The central position in a network means being in the nexus of innovation	Company 2 is in a central position, but it is not bringing innovation.
	Innovation requires accessing external resources	

Assumed and found

Unit B is not looking for increased innovation in its network, and thus it is operating in a closure, which is in line with the theoretical assumptions driven from the theoretical framework. Companies in a closure are assumed to have a similar knowledge, and it is visible in similar competence bases of companies. Because transaction costs are caused by a lack of standardization companies cannot afford to have weak ties, and thus learning is limited in collaboration.

What is new?

Companies are operating in a closure, but they do not facilitate the flow of knowledge, because the co-opetitive relationships they have. Unit B sources knowledge-intensive services, but do not aim for increased innovation potential, but gain similar resources to the ones they already have to reduce risks and to take competitors out of the market. Unit B is in a central position in the network, but the position is not used to gain access to knowledge or innovation, and that is not likely to be due to the closure position.

8.3 UNIT C

Standardization and tacitness

Unit C transfers tacit knowledge in their operations with venture capitalists, and together they create new knowledge. The knowledge created concerns the strategic choices that both venture capitalists and Company 2 make.

Operations with venture capitalists are not standardized, but are developed by personal interactions and face-to-face meetings. For portfolio companies Unit C provides the kind of platform that offers them solutions to do business. The platform that Unit C offers to venture capitalists in the form of assets it has built to let companies to gain access to Company 2's customer base. The assets Company 2 had earlier and which are now shared with other companies are technology, technology development and research facilities, and most importantly the customer base.

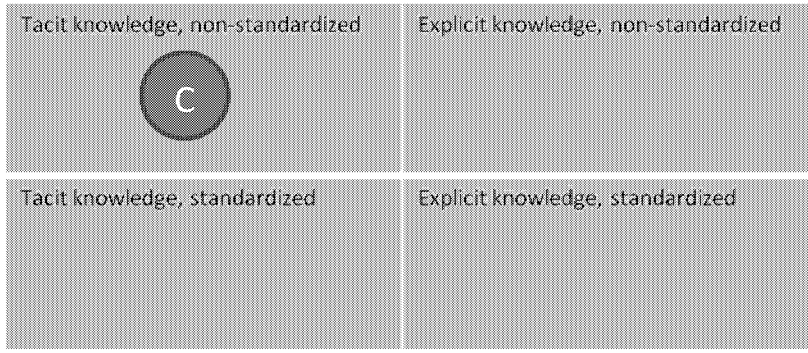


Figure 28. Standardization - tacitness of Unit C.

Overcoming transactional uncertainty

There is high transactional uncertainty in the operations of Unit C. Information asymmetries are significant, the solutions are unique, and there is very little standardization.

The fear of opportunism is high and thus there is a need for trust-building. Trust has been built through personal communication and information exchange inside the venture capital community. In the venture capital community Unit C operates in a closure, as venture capitalists often collaborate and relationships overlap. Venture capitalists perform search across chosen industries, form new relationships, and venture capitalists may act as a broker between industries. Unit C is in structural hole position between venture capital community and potential customers, to which Company 2 has either established relationships or good reputation in the industry. Company 2 has the credentials that allow introducing portfolio companies to customers.

Information asymmetries between venture capitalists and Unit C allow Unit C to promote the technological areas that are important for Company 2, since venture capitalists have less knowledge of the technological needs of potential customers. It is difficult to remove information asymmetry because it is based directly on the tacit knowledge of Company 2 that is part of its core competence. Information asymmetries enable opportunism, which is not a threat as long as companies have vested interests. Contradicting interests are avoided by choosing collaborators whose technology areas do not significantly overlap. On the other hand Company 2 is choosing such portfolio companies for collaboration that provide products and services that are complementing, and not competing with, its own products.

There is also information asymmetry in that the venture capitalists have better knowledge of the portfolio companies. Venture capitalists have selected industries in which they operate, and they monitor the industry all the time for potential new portfolio companies. In the relationships between Unit C and venture capitalists there are significant asymmetries, but they do not give negotiation power to either party. The knowledge is also tacit enough that it would be difficult to objectivate, and thus there are would be high transaction costs between the parties.

Tacitness has been lowered by objectivation in some parts. Unit C opens up the knowledge it has of technological development and what technologies Company 2 will invest in. Unit C and venture capitalists exchange strategic information.

Table 21. Overcoming transactional uncertainty in Unit C.

Transactional uncertainty	Assumption	Unit C
	Information asymmetries increase transactional uncertainty	Transactional uncertainty is high and that is partly because of the tacitness of knowledge.
	Information asymmetries act as an isolating mechanism protecting the source of competitive advantage from imitation	Information asymmetries are not given up partly because tacit knowledge is a source of competitive advantage.
	Information asymmetries increase the potential for opportunism	Information asymmetries cause both parties can advocate their own interests.
	Information asymmetry gives negotiation power to the party with more information	Information asymmetries are high, but they do not give negotiation power to any party.
	Trust reduces opportunism	Fear of opportunism is high, and trust has been built by personal communication and information exchange. Partly the tacit knowledge is not objectivated because of the fear of imitation.
	Facilitating the flow of information and knowledge increases trust and reduces opportunism	In the venture capital community Company 2 operates in a closure, but between venture capital companies, portfolio companies and potential customers Company 2 is a structural hole.
	Closure is an efficient production system	Company 2 is not aiming at efficient production.
	Information asymmetry represents itself so that a client also has the knowledge and information needed, that is the situation in co-productive relationships.	Relationships are co-productive, and both parties have the information and knowledge needed.
	The tacitness of knowledge is a source of transaction costs.	Tacitness causes transaction costs since it requires building trust and having face-to-face personal contacts.
	Tacitness can be lowered by objectivating knowledge.	Knowledge is so tacit that it is difficult to objetivate.
	Objectification is aided by shared language and tools, common procedures, shared technical and organizational knowledge, long-term relationships and shared collaboration codes.	The parts of the tacit knowledge have been objectivated, like Unit C opens up the knowledge it has on technological development.

Assumed and found

Unit C and its collaborating companies have very different knowledge bases, and thus information asymmetries are high. Companies do not aim at removing all information asymmetries, as they protect their competitive advantage. The knowledge base develops continuously, and it would be difficult to objectivate all relevant knowledge.

Information asymmetries allow for the potential for opportunism in relationships between Unit C and its collaborators. Companies can pursue their own interests in a relationship, as the other party cannot assess their operations because of the lack of knowledge. However the trust between parties reduces the risk of opportunism. Venture capitalists operate in a closure, and opportunistic behavior amongst them surfaces more easily. On the other hand Unit C used a significant amount of time and resources to build trust in its relationships with venture capitalists, and it is not very likely to jeopardize that achievement with opportunistic behavior.

Unit C reduced information asymmetries by sharing technical and organizational knowledge with collaborators. There is tacit knowledge that Unit C is not willing to objectivate even if that would enable more efficient collaboration, as that knowledge is part of their competitive advantage. Objectivation of that knowledge would increase the risk of imitation, not among venture capitalists, but among the other companies they are operating with.

Relationships between Unit C and venture capitalists are truly co-productive, since they combine the dissimilar knowledge bases they possess to create new knowledge and to enable innovation. Neither party is in a position where they could use the information asymmetries between companies as a source of negotiation power.

What is new?

Unit C has overcome the difficulty of transferring tacit knowledge through weak ties, which would allow learning, by operating in a closure and having strong ties with companies that carry out search for it. In a venture capital community Unit C can transfer and create tacit knowledge, and that tacit knowledge allows venture capitalists to find suitable portfolio companies for Unit C. Furthermore, Unit C bridges portfolio companies and potential customers for them.

Information asymmetries are high in Unit C's and venture capitalists' collaboration, but that does provide negotiation power to either party, since their success is co-dependent. Unit C operates in a closure in the venture capital community, but the goal is not efficient production but the possibility of transferring tacit knowledge.

Efficiency of network

The price of the collaboration consists of the transaction costs that a firm encounters. Collaboration parties invest time in the relationship they form, and information transfer requires resources. This investment brings in returns in the form of access to new

knowledge and resources. Venture capitalists gain returns since their portfolio companies are more successful due to the access of customers and technological support.

Since collaboration is not standardized but is on a case-by-case basis, it is costly. The costs of collaboration are lowered by trust-building and the objectivation of knowledge. Trust-building has been an adaptation that increases the efficiency of collaboration. There is extensive evidence that parties do not objectivate as it is too difficult, too risky, or too costly.

Venture capitalists compete against each other, but they also collaborate. Company 2 has selected in each technological area certain companies to collaborate with, and thus venture capitalists are not largely overlapping in their competences. Information asymmetries are high on each side, but companies can trust that they have common interests to take care of.

Table 22. Efficiency of network in Unit C.

Efficiency of network	Assumption	Unit C
	The costs of knowledge transfer defines which operations are done in-house	The cost of knowledge transfer is high, and companies have to decide how much they invest in relationships that bring new knowledge and information in.
	Tacit knowledge is slow, costly, and uncertain for transfer, and thus objectification decreases costs	Part of the knowledge has been objectivated, but large parts are too costly, difficult or risky to objectivate.
	KIBS may increase their delivery performance with a certain client through adaptations	Trust-building and regular information transfer are the adaptations companies have made.
	Cost competition in KIBS is rare, but standardization would increase cost competition.	There are no standards, collaboration is personal and case-by-case.

Access to new knowledge and resources

Company 2 searches for new knowledge in networks. By building up a network with venture capitalists, company 2 can access new knowledge and resources that are part of their portfolio companies, which operate in the fields of emerging technologies. Unit C chose not to compete against venture capitalists but to specialize and collaborate.

Company 2 has enhanced its access to new resources and knowledge by changing the information exchange between networks. Portfolio companies can access the customer base of Company 2 and also technology development and research facilities. Venture capitalists access the technology strategy Company 2 is implementing and the future needs of its customers. That eases the entry into the market for a portfolio company. They could not achieve this kind of growth alone since they lack the credibility in market and relationships with customers, complementing services or technology, and resources for developing and providing services. Venture capitalists instead do not have the knowledge

of the ongoing development in large companies and their customers to the extent that they could approach suitable company units directly.

Company 2 is in a central position in a venture capital network, as it is operating with the top venture capitalists, which have links to other venture capitalists. It is also in a broker position. That means it is in a good position to be in the nexus of innovation. Company 2 accesses new knowledge through its venture capitalist network. Companies have specialized roles, and the competences complement each other more than they overlap. Unit C acts as a broker between venture capitalists, portfolio companies, and potential customers, and adds a totally new information channel across those companies.

Table 23. Access to new knowledge and resources in Unit C.

Access to new knowledge and resources	Assumption	Unit C
	Innovation is achieved by combining different knowledge sets	To achieve innovation potential Unit C links portfolio companies, which have new knowledge to the existing knowledge of Company 2.
	Networks can be used to search for new knowledge	Company 2 has enhanced its access to new knowledge through its venture capitalist network.
	Weak ties are important for learning.	There are weak ties between venture capitalists and portfolio companies, and that allows venture capitalists to access knowledge outside the closure of a venture capitalist network. That learning can be to the benefit of Unit C.
	The central position in a network allows for being the nexus of innovation. Innovation requires accessing external resources.	Unit C has a central position in a venture capitalist network. That allows it to access companies that have new knowledge and technologies and thus create a potential for innovation.
	A company can enhance its access to knowledge by facilitating its knowledge distribution in the network	Unit C has transformed information and knowledge transfer in network.
	A structural hole position should allow access to new markets and new knowledge better than closure	In a closure tacit knowledge can be transferred and created, but structural holes allow access to heterogeneous knowledge bases.

Assumed and found

As was assumed in the theoretical framework, to gain innovation potential in a network a company has to be able to access new knowledge. The central position of Unit C allows it to access a wide part of the venture capitalist community, and thus a variety of new information and knowledge. Weak ties have been viewed as important for finding new

knowledge. Unit C has weak ties to the portfolio companies of venture capitalists, but strong ties to venture capitalists.

Unit C uses the network primarily in order to search and access new knowledge. It has built relationships to gain a central position and to broker over different industries. Thus Unit C utilizes its broker position in order to gain access to new information and knowledge. Unit C enhances the distribution of knowledge in the venture capital network by arranging meetings where technology development issues are discussed.

What is new?

As there is tacit knowledge that Unit C and venture capitalists are not willing or capable of objectivating, the collaboration requires long-term relationships and trust. Thus the companies are operating in a closure. However there has to be structural holes in relationships to portfolio companies and customers to create access to new and dissimilar knowledge and better profits. Unit C overcomes that problem by transferring tacit knowledge with venture capitalists, and venture capitalists carry out the search for Unit C to find new knowledge and resources that complement the capabilities of Company 2.

9 DISCUSSION AND CONCLUSIONS

This final chapter discusses the context-dependence of competitive advantage in networks that was found. First the sources of competitive advantage in network are discussed from the point of view of how they are dependent on dimensions of transactions: The degree of tacitness and level of standardization. Then the main contributions of study are brought together. The study is evaluated in terms of scope and conduct and contributions of the study. Then the practical implications, limitations of the study and suggestions for further research are presented.

9.1 Context-dependence of competitive advantage in KIBS networks

In the following I compare the findings of the cases in terms of how the competitive advantage derived from a network is dependent on the standardization and tacitness.

1) Companies specialize. This leads to productivity gains on a network level.

As was assumed, specialization is hindered by a lack of standardization, because companies maintain overlapping competences to be able to define and specify the services they want. A lack of standards also decreases the potential for companies to specialize, as it is difficult to divide tasks between companies. Task allocation in several companies requires extensive communication as interfaces are not standard and companies are dependent on the work of other companies in order to fulfill their own goals. This overhead causes companies to be better off if they have a wide base of competence and thus can also independently carry out development projects. The lack of specialization makes collaboration less efficient and the whole network is worse off, as costs reductions are difficult to gain even though there is cost competition in the industry. In a co-opetitive network cost competition may be due to the similarity of competence bases which leads to a situation where a customer has several companies bidding any one of which could carry out the development alone. It was found that specialization cannot be effectively promoted if both standardization and tacitness are not considered. To gain specialization companies have to objectivate knowledge and standardize transactions.

Standardization seems to be especially crucial for the specialization of services, as services are intangible and defining and monitoring service require overlapping knowledge.

2) Companies adapt to each other and create relation-specific investments. This allows productivity gains and enhanced access to knowledge and resources

It was assumed that specialization reduces the need for adaptations and the relation-specific investments, and tacitness increases it. In the case companies, a form of relation-specific investments that companies create is the sharing of technical and organizational knowledge. Companies use time and resources to build trust, and thus trust can be also be regarded as an investment in their relationship. Creating relation-specific investments allow companies to objectivate knowledge and makes deliveries more efficient. Trust also

decreases transaction costs and thus makes interactions more efficient. Building relation-specific investments makes multi-sourcing or switch suppliers less beneficial, as it decreases transaction costs in the relationship. If collaboration requires relation-specific investments, it is too costly or impossible for a company to maintain weak ties. That hinders the potential for learning and accessing new resources and knowledge.

3) Companies use the network to search for and access new knowledge and resources, leading to innovation.

Even companies that are in a central position in their network cannot utilize their position to access new resources and knowledge if tacitness or lack of standardization makes relationships efficient only as a long-term relationship and with high investments. Knowledge-intensive business service companies also look for other sources of competitive advantage aside from valuable new knowledge or resources. Other reasons for networking are balancing resource needs, sharing risks by allying with competitors, and the more effective use of their own resources as they can be concentrated on core competence areas.

A lack of standardization and tacitness of knowledge increases the difficulty of finding new useful knowledge. Companies need overlapping competences to be able to collaborate. Standardization helps in defining the problem or need that requires new knowledge to be answered. Tacitness of knowledge makes it stick to a specific location and tacit knowledge does not move in the network.

It is suggested that a broker position is superior in finding new knowledge and resources. However structural holes in a network make the ties weaker and thus tacit knowledge is not likely to transfer through those weak ties. The more explicit the required knowledge is, the more useful the broker position. If a company is not interested in new knowledge and resources, e.g. if the industy or product is mature, it is likely that they will pursue a closure position rather than a broker position. Similarly if a company is aiming at creating trust and long-term relationships between partners and thus facilitating the creation of tacit knowledge, it is easiest to operate in a closure, where knowledge is overlapping.

It was found that a company can utilize its central position in a closure to find new information and knowledge through second-tier ties to companies in the cluster. Companies outside the cluster may be valuable, and a company may utilize companies in the cluster to look for new resources and knowledge.

4) Facilitating the flow of knowledge builds trust.

All units are operating in a closure. However, companies are not eagerly building up network resources that would facilitate the flow of knowledge. Therefore to increase trust in their bilateral relationships companies facilitate the flow of knowledge by sharing tools, development environments and organizational processes.

Companies are not interested in increasing the efficiency of the whole network, maybe because of co-opetitive relationships. All units face a co-opetitive environment, and they

are careful in information and knowledge sharing since they are afraid of disclosing knowledge that is a part of their competitive advantage.

5) Providing social credentials.

In case of Unit C, I recognize that companies in co-opetitive networks utilize social credentials to overcome the risk of opportunism. In Unit C the situation companies use the network to access 'friends of friends', and thus they do not need to form unique relationships with all portfolio companies to be trusted among them. Venture capitalists trust Unit C, and the credentials they provide to their portfolio companies, and vice versa, allow for the building of business relationships, avoidance of higher search and contracting costs and trust-building.

Unit C brokers over structural holes and provides social credentials in its customer networks for portfolio companies. A lack of standardization and tacitness of knowledge, which makes it difficult to search and compare knowledge resources, raises a need for social credentials. However providing social credentials is not seen in other units as important, and this is a bit unexpected that a company in a brokering position provides social credentials and ones in closure positions do not.

6) Objectivating knowledge decreases tacitness, lowers information asymmetries.

Objectivation is aided with sharing technological and organizational knowledge. That need for sharing increases transaction costs and creates long-term relationships as formation of relationships requires investment of time and resources. The objectivation of knowledge increases the fear of opportunism. Companies are unwilling and sometimes unable to objectivate knowledge that is the basis of their competitive advantage. Companies are willing to objectivate e.g. technical knowledge that allows more efficient production as it reduces transaction costs. The inability to objectivate knowledge and share it with collaborators may also be because the knowledge base develops so rapidly that objectivated knowledge would soon be out of date.

At least in software development, standardization and tacitness are interlinked in the creation of modular software. Defining a modular architecture requires the objectivation of knowledge and the creation of a standard interface between modules.

Table 24. Sources of competitive advantage in a network and their context-dependence.

Source of competitive advantage	What was known	What was found
Companies specialize	Standardization allows specialization, since companies need less overlap to specify services, contract and monitor. KIBS companies tend to offer particularized services instead of standardized services. Standardization would increase firm size which tends to be small. Tacitness makes specialization	The lack of specialization makes collaboration less efficient and the whole network worse off. Specialization cannot be effectively promoted if both standardization and tacitness are not considered. A lack of standardization causes: - overlapping competences are needed to be able to define and specify the service they want - it is difficult to divide tasks between companies, requires extensive

	more difficult, as companies need overlapping knowledge bases to be able to collaborate. Networks that transfer and create tacit knowledge are less likely to enjoy productivity gains.	communication This overhead causes a need for overlapping competences, and companies are better off if they have a wide base of competence and can also independently carry out development projects. Cost competition may arise in a co-opetitive network due to the similarity of competence bases which leads to a situation where a customer has several companies bidding, any of which could carry out the development alone. Standardization seems to be especially crucial for the specialization of services, as services are intangible and defining and monitoring a service requires overlapping knowledge.
Companies adapt to each other and create relation-specific investments	Lack of standardization causes a need for adaptations to make relationships efficient, and also increases the significance of trust-building. Standardization makes adaptations less useful. Passing tacit knowledge requires relation-specific investments, and those kinds of investments can be useful and profitable, if they allow access or the creation of valuable tacit knowledge.	Tacitness and a lack of standardization causes a need for adaptations and relation-specific investments. Companies adapt by - Sharing technical and organizational knowledge - Building trust, and thus trust can be also be regarded as an investment into the relationship Relation-specific investments - Allows companies to objectivate knowledge in the relationship and makes deliveries more efficient - Make multi-sourcing or switching suppliers less beneficial - Make it too costly for a company to maintain weak ties and thus hinders the potential for learning and accessing new resources and knowledge.
Companies use networks to search for and access new knowledge and resources	Standardization allows efficient search and access of knowledge and resources, especially with non-complementary resources and knowledge. Several studies found that weak ties are important for learning and bring in special knowledge and competence. However it has been claimed that tacit knowledge cannot be transferred or created through weak ties.	A lack of standardization and tacitness of knowledge increases the difficulty of finding new useful knowledge and resources and makes an otherwise favorable network position, the broker position, less useful. KIBS companies pursue - valuable new knowledge - balancing resource needs - sharing risks - more effective use of their own resources. The more explicit the knowledge needed is, the more useful the broker position is. If a company is not interested in new knowledge but in efficient production, it is likely to benefit from a closure position. Similarly if a company is aiming at creating tacit knowledge in network, it is easiest to operate in a closure. Companies may utilize relationships in a cluster to look for new resources and knowledge trough second-tier relationships.
Facilitating the flow of	Non-standardized transactions work most efficiently in a	In contrast to what was assumed, companies were not building network resources that

knowledge	closure, and in a closure facilitating the flow of knowledge is a way to increase trust and network efficiency. The tacitness of the knowledge in transactions increases information asymmetries and thus increases transactional uncertainty. It is claimed that KIBS companies create long-term trustful commitments in order to be able to deliver their services. Facilitating the flow of information is a way to enhance trust-building.	would facilitate the flow of knowledge to build trust on network level and increase the efficiency of the whole network even though they had non-standardized transactions in a closure. This is at least partly caused by co-opetitive relationships, and a fear of disclosing knowledge that is a part of their competitive advantage. At a bilateral relationship level companies facilitate the flow of knowledge by sharing - Tools - Development environments - Organizational processes
Providing social credentials	A lack of standardization makes search and monitoring costs higher, and social credentials more important than in a situation where services are easy to compare and monitor. Providing social credentials is important when tacitness hinders possibility of lowering transaction costs. Since search costs are high, it is too expensive to evaluate all possible collaborators.	A lack of standardization and tacitness of knowledge, which make it difficult to search and compare knowledge resources, raises the need for social credentials. Social credentials were used to overcome transactional uncertainty caused by tacitness of knowledge in overcoming the risk of opportunism. Social credentials in a network were used to access 'friends of friends', to avoid high search and contracting costs, and to build trust. What was unexpected was that a company in a brokering position provides social credentials and ones in closure positions do not.
Objectivating knowledge	Tacit knowledge is a source of competitive advantage as it is not easy to transfer. Explicit knowledge transfers easily and is prone to imitation. In a situation where transactions contain tacit knowledge objectivation can make transactions less costly.	Companies are unwilling to objectivate knowledge which is the basis of their competitive advantage, and sometimes unable to, since the knowledge base develops so rapidly objectivated knowledge would be soon out of date. Objectivation is aided by sharing technological and organizational knowledge. That need for sharing increases transaction costs and makes relationships long-term. Objectivation of knowledge increases fear of opportunism. At least in software development standardization and tacitness are interlinked in creation of modular software.

As table 24 suggests empirical evidence reinforced the theoretical assumptions. The competitive advantage gained through specialization is perceived as being an important reason why companies utilize networks. However in KIBS networks specialization is difficult to attain, as it requires both standardization and a low level of tacitness. Resources that are sought in network are not only dissimilar but are also complementary, and access to new knowledge was not perceived as important as expected: Creating tacit knowledge inside firm and gaining explicit knowledge in network was visible. Network efficiencies in KIBS networks are sought by adaptations, and that hinders the possibility of utilizing weak ties. KIBS networks also used very little and the possibility of building network resources that would enhance information transfer. Providing social credentials

inside network was perceived as less important in a closure than was expected, and instead companies provided social credentials in a network with structural holes. Objectivating knowledge to lower transaction costs was hindered by a fear of opportunism, since companies were operating in co-opetitive networks.

The findings on cases suggest that the context where competitive advantage is pursued affects to the results. The characteristics of KIBS networks mean that making adaptations and accessing similar resources is more important than in other types of networks. In all cases the level of standardization was low, even though the companies were willing to increase the amount of standardization especially in one of the cases.

In the empirical analysis I found that primarily the cases conformed to the assumptions of the theoretical framework. However, the empirical analysis highlighted the interdependence between the level of standardization and the degree of tacitness of knowledge. The standardization of services implies the objectivation of tacit knowledge. Companies have recognized the sources of competitive advantage that they could attain if they could increase the level of standardization. Standardization is however difficult, partly because of the interdependence mentioned above.

Case studies suggest that companies do not facilitate the flow of information in their respective networks in situations, where theoretical framework suggests it to be beneficial. A reason for that unwillingness is that companies want to protect their knowledge from imitation, and thus do not want to objectivate that knowledge and make it more prone to imitation. In co-opetitive networks companies are especially unwilling to facilitate the flow of knowledge.

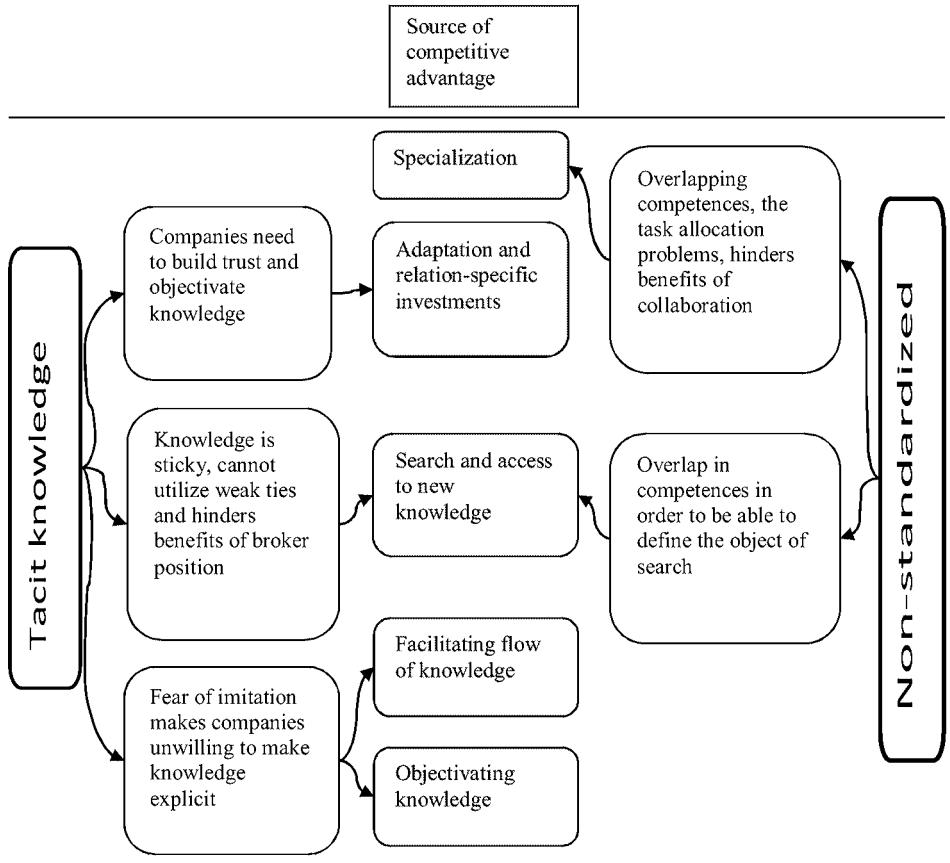


Figure 29. Interdependence between dimensions and sources of competitive advantage in cases.

In figure 29 the sources of competitive advantage that were visible in case studies are presented. The findings on the interdependencies between the dimensions (tacitness of knowledge and level of standardization) and the sources of competitive advantage are derived.

A low level of standardization produces the following characteristics: a tendency to operate in a closure and build trust, inefficient competition, production efficiencies by adaptation, and high information asymmetries. A lack of standardization causes information asymmetries since the service provided is not predefined either by the end result or by the process. Thus the service provider and service purchaser collaboratively define the service as they make a contract. That makes a comparison of service providers difficult, and since the service offerings are not similar, cost efficiency is not the main factor in competitive advantage. However cost pressure also extends also to KIBS networks. Since bidding is not efficient and relationships are long-term the question often is to make-or-buy. The companies coped with information asymmetry by having overlapping resources. Resource overlap decreases information asymmetry, and enables specifying the service and also allows monitoring and control. Resource overlap reduces the specialization of companies, and thus makes a network less efficient in terms of task allocation and economies of scope.

The high level of standardization causes the following characteristics: Utilizing structural holes, efficient competition, a low level of adaptation between parties, and low information asymmetries. Case Unit A represented a situation where increased standardization was viewed as a lucrative scenario, as it would allow for short-time partnering, multi-sourcing, and decreased overlap of competences, and Unit A was going to that direction. Standardization would allow it to benefit from its central position in the network by utilizing structural holes and brokering over them. Case Unit A brought up a situation, which suggested that there is interdependency between standardization and tacitness of knowledge: Defining software modules and standard interface between them requires making explicit the tacit knowledge that software developers have. That would also increase the rigidity of architecture, and a big challenge in software development is that modular software does not perform at as high a level and in some cases that may be critical.

A high level of tacitness causes the following characteristics: Particularization to client, competence overlap, adaptations, close relationships, risk of opportunism, transactional uncertainty, relation-specific investments, creating knowledge that is valuable for innovations and a willingness to protect assets from imitation. In case studies tacitness caused close relationships since companies need to create trust and common assets in order to be able to transfer tacit knowledge. That also causes need for relation-specific investments and adaptations. Companies adapt to each other as they share development environments or choose technologies that are in line with the goals of their partners. These kinds of adaptations make it costlier to operate with companies using different technologies or environments, and increase productivity in that specific relationship.

Tacitness decreases firm size as it ties the area of potential customers to a certain location. That was seen in Unit C, as the creation of trustful relationships required for face-to-face communication, which could not be replaced by utilizing ICT. However, a significant number of venture capitalists are located within Silicon Valley and it is easier to operate with a large number of them. Company 2 has also been able to use its global reputation for building trustful relationships outside Silicon Valley.

A low level of tacitness enables the following characteristics: Specialization of firms, large firm size, a low level of adaptation, accessing new information and knowledge through relationships, facilitating the flow of knowledge in a network, productivity gains at a network level, complementarity resources, and a high risk of imitation. Companies that operate in areas where most parts of knowledge is explicit, like in software development, can specialize better, adapt less, and utilize complementary resources and new knowledge. However these benefits were hindered due to the lack of standardization. Companies need overlapping competences to be able to define and monitor non-standardized services, and searching and partnering with new service providers is difficult unless you do not have a standardized way to provide that service. The risk of not getting what you have been looking for is too significant, and thus companies stick to same service providers or carry out development in-house.

The findings bring new insight to the different network types and how dimensions affect the potential sources of competitive advantage that are gained: Type 2 and Type 3 are

likely to represent each other more than was assumed, as the effects of the dimensions level of tacitness and level of standardization were not as independent as assumed. In many situations, it seemed that the benefits of standardizing service production or making knowledge explicit were not realized as effects of other dimension hindered the effects. Thus as long as there is either a low level of standardization or a high degree of tacitness, there seems to be a competence overlap instead of a possibility of seeking new distinctive information, a structural hole position is difficult to utilize, and production efficiencies are sought by adaptations in a relationship.

9.2 Contributions of the study

In the following I go through the main theses of the study, and explain them on both a theoretical and empirical basis.

Networks should be considered to be a place to potentially gain sources of competitive advantage.

Supplier networks are a potential source of competitive advantage (Dyer 1996). Companies gain a competitive advantage in networks, which is in forms of access to better or novel resources, information, product and markets, lower costs efficiency and risk sharing (Möller et al. 2005, Håkansson & Snehota 1995, Gimeno 2004).

As companies pursue networked sources of competitive advantage they encounter challenges such as dependence on resources outside the company boundaries, lock-in situations and a loss of competence (Möller et al. 2004, Iansiti & Levien 2004, Håkansson & Snehota 1995). That is one reason why companies should consider their strategies on a network level. Another reason is that a company can choose to either pursue the interest of the whole network or its own interest (Porter 2004). Network specialization is inversely proportional to the competition inside of a network, and proportional to internetwork competition (Gimeno 2004).

By conceptual analysis the competitive advantage that is derived from a network raised both sources based on the access to resources and based on lowering of transaction costs. There are six sources of competitive advantage in the network context:

1. Companies specialize.
2. Companies adapt to each other and create relation-specific investments.
3. Companies use the network to search for and access new knowledge and resources.
4. Facilitating the flow of knowledge.
5. Providing social credentials.
6. Objectivating knowledge.

Gaining a competitive advantage from a network is dependent on the context of the transactions. In KIBS transactions the dimensions defining the context have a level of tacitness and a degree of standardization.

The departure point in this study is that the sources of competitive advantage can be gained in collaborative networks. In this study I claim that for the networks of knowledge-intensive service companies the sources of competitive advantage that can be gained are dependent on two dimensions: the level of standardization and the degree of tacitness of knowledge transferred in service transactions. Thus the sources of competitive advantage found in the network are context-dependent. The level of standardization and the degree of tacitness have an effect on how high the transaction costs in network are and how companies can utilize the resources of other companies in the network.

In earlier literature the relationships of knowledge-intensive business services have been characterized as complex, unstructured, customized, close, co-productive, difficult to alter, inseparable, local, with the co-creation of knowledge, policies preventing competition and information asymmetries. The characteristics of the relationship are interpreted to result from the dimensions of knowledge-intensive business services, which are derived to be tacitness of knowledge that is created or transferred in order to provide service, and the level of standardization of service. Tacitness of knowledge is a dimension of the knowledge-intensity, and the degree of standardization is a dimension for understanding the service nature of the transaction. Even when discussing knowledge-intensive services the transaction may consist of only explicit knowledge, and thus not all KIBS transfer tacit knowledge. Especially in software services, the standardization dimension is clearly the defining measure if an offering is a service or a product. Thus it is likely that in some of the KIBS relationship characteristics depend on the level of standardization. Some of the relationship characteristics of KIBS are due to tacitness (co-creation of knowledge, localness and innovation potential), some are due to standardization (complex, unstructured, customized, difficult to alter, inseparable, contain policies preventing competition), and some are due to both (close relationships, co-production, information asymmetries).

Tacitness and standardization are the most relevant dimensions considering the competitive advantage in KIBS networks. Standardization affects the transaction costs of services, both standardizing the end result and the process, and in this way contributes to the utilization of social capital and access to resources. Tacitness is important, since the competitive advantage of KIBSs is claimed to be dependent on tacit knowledge assets. Networks of KIBS are divided into four types according to their relationship with the two defined dimensions, and the potential sources of competitive advantage are assessed for each type. That assessment is made based on the existing literature. The assumptions for each type are reflected to empirical data. Case studies are typified according to their standardization and tacitness levels, and the findings are used to increase understanding of potential sources of competitive advantage in KIBS networks. Based on the theoretical framework the following findings are presented concerning the context-dependence of sources of competitive advantage:

- The low level of standardization means it is beneficial to facilitate the flow of knowledge and thus to try to lower the transaction costs inside the network. That increases trust, which is needed to overcome transactional uncertainty caused by a lack of standardization. Companies pursue efficient production through adaptations. Companies that provide social credentials as services are difficult to compare prior to purchase.

- The high level of standardization means that it is possible to utilize the resource-based benefits, especially access to new knowledge. Companies can specialize and do not need overlapping knowledge.

- The low degree of tacitness causes the knowledge that is accessed to be not especially valuable, and it is easy to pass and imitate. On the other hand it is also easy to access new knowledge through weak links. Companies need not to build trust or invest in relationships.

- A high degree of tacitness causes a company to gain a competitive advantage by building relationship-specific resources investing in them and building trust. Creation and the transfer of knowledge require complementary knowledge. Knowledge is also valuable for innovations.

In the empirical analysis, the things that arouse support and complement the theoretical understanding of context-dependent sources of competitive advantage that is gained in networks are presented in table 24. In short, the findings are as follows:

- The low level of standardization: Was not what was assumed, trust-building was not enabled by enhanced information flows, most likely because companies protected their knowledge in a co-opetitive network. As assumed, companies pursue efficient production through adaptations. Companies also provided social credentials to overcome transactional uncertainty, but in a closure; it was over structural holes and not as much as assumed.

- A high level of standardization: Companies perceived the benefits of standardization, and pursued standardization because of them. This brings services closer to goods production. However gaining standardization is interlinked with objectivating knowledge and transferring less tacit knowledge, you cannot successfully pursue only one of them.

- A low degree of tacitness: Companies need weak links to access new and dissimilar knowledge. Companies operating in a closure may utilize second-tier relationships to reach out closures for new knowledge.

- A high degree of tacitness: In a network, which is created to gain new knowledge and innovation, knowledge has to be partly tacit, and it cannot be wholly objectified. On the other hand objectifying the information is not desirable as it is part of competitive advantage of the companies that posses it and thus it is protected from imitation. Relationships have to be trustful.

Network strategies should be chosen based on the context of network transactions.

In a network, where tacitness is high and standardization is low, companies can utilize an emerging value network model to allow for the creation of new knowledge in relationships. In the situation where standardization is low, a strategic network model may be useful, as it emphasizes the benefits gained through increased performance by adaptations and relation-specific investments. In network with a low level of standardization and a low level of tacitness companies can utilize the established value network model. When there is low amount of tacitness and high degree of standardization, companies can utilize either the business ecosystem model, or a stable value network, depending on whether they want to gain access to the new knowledge and thus have a higher innovation potential (business ecosystem) or cost efficient network avoiding small numbers (stable value network).

The models of strategic business networks that were recognized are strategic networks, strategic business nets, and business ecosystems. The choice of model to be considered was based on competitive advantage, and thus models that are more concerned with e.g. network structure and actions and less on strategizing were left out. The chosen models were assessed in terms of the competitive advantage they suggest was gained. That showed the differences between models, and also gives insight into the kind of networks that could be useful. A Strategic network relies mostly on the advantages that are gained through increased efficiency in strongly tied networks. A strategic network model is inspired by transaction cost economics. A focal company facilitates the flow of knowledge between parties and builds trust, and thus decreases the transaction costs between parties. Companies can also adapt to each other and thus increase efficiency. Transaction costs regarding parties outside the network remain the same, and thus building trust inside the network increases switching costs to other suppliers. That leads to a small numbers situation, even though the ties are not permanent. In a strategic network companies specialize, and thus there are better chances of developing competences inside companies. A strategic network however is not a suitable model in a situation where the focal company would like to access to new resources and knowledge through the network.

Strategic business net is a model utilizing an Industrial Network Approach as a base network theory. A strategic business net has a more elaborate view of different sources of competitive advantage than a strategic network does. The three types of business nets are recognized, and besides recognizing a similar production network as strategic network model, a strategic business net can also be a network aiming at creating new knowledge, and thus it also has to reach new knowledge and resources.

A business ecosystem as a model that is inspired by complexity theory, and it emphasizes the robustness, productivity and survival of a network. A focal company can aim for those goals by providing a platform for other companies use. A platform is a standardized set of solutions. This kind of platform is formed by the objectivation of knowledge, and opens up that knowledge for anybody's use. The knowledge that is of value may be e.g. a technical solution or a channel for business. The idea is that the end customers are the better served when there are more services or applications on a certain platform, and thus platforms compete against each other. These kinds of platforms are commonly seen in the

ICT industry, where they may be technical platforms. A platform may also be a business platform, such as eBay. Companies can use that platform without investing heavily in the relationship with its provider, and they gain certain functionality which they do not need to build themselves. The possibility of using a platform without big investments allows access to new knowledge and resources, and companies do not need to adapt to each other.

9.3 Practical implications of the study

This study suggests that as collaborative networks rise, a company should take into account the sources of competitive advatage gained from networks in their strategy making. Competition increasingly moves between networks, as companies try to achieve the same network benefits as their competitors. The sources of competitive advantage gained from a network are basically the same as the sources gained inside a company, and they rely on resources and position. However, in KIBS networks access to these sources is interdependent with the level of standardization and tacitness of transactions. Thus companies have to consider their network strategy as being in line with the nature of their transactions. As well companies have to consider how the changes they make in terms of standardization and tacitness affect to the competitive advantage they can gain from the network.

The standardization of a knowledge-intensive business service is another dimension, that is a big question in all service business. Companies facing cost competition tend to answer to it by reducing the particularization of a client and increasing the degree of standardization. In service production the special characteristics of services are interlinked with a low level of standardization. Attempts to increase standardization are likely to make service business more like manufacturing, but that requires standardizing service production process as well as the end result. Increased standardization is also likely to give the customer more options and it is easier to search for alternatives and make bids thus answering to cost pressures increases in cost competition even more. Service standardization in a KIBS situation also means the objectivation of knowledge in order to build standard interfaces and processes. That would increase risk of imitation. In networks with a low degree of standardization companies should adapt to each other and create relation-specific investments, facilitate the flow of knowledge and provide social credentials. In networks with high standardization companies should specialize, use networks to search and access new knowledge, resources and objectivate knowledge.

The tacitness of knowledge that is created or transferred is a dimension that is already already essential in the knowledge-based view of a firm. It is brought to explain the failure of the market and is claimed as the reason why a firm is needed, since a firm is a better unit for creating knowledge than a market. KBV also claims that only tacit knowledge can be of value for a firm, and tacit knowledge does not transfer through weak ties. However, the social capital view suggests that weak ties are important for learning and a broker position is better for accessing new knowledge than closure. What does that mean for a knowledge-intensive service firm? Is it possible to gain new, valuable knowledge in a network? This study suggests that it is challenging since purchasing knowledge-intensive

business services requires overlapping competences, adaptations and trust, and thus accessing knowledge that is dissimilar to knowledge that is already possessed or knowledge and resources outside the closure is difficult. The possibility of enhancing access to new knowledge and thus increasing innovation power is found in building relationships like in Unit C, and exploiting second-tier relationships in order to access new and dissimilar knowledge. In networks, where transactions have a high degree of tacitness, companies need to adapt to each other, create relation-specific investments and thus increase performance. They also need to facilitate the flow of knowledge to create trust, and provide social credentials. Companies cannot specialize to avoid all overlap, and also accessing really new knowledge is difficult. Companies can facilitate the flow of knowledge, by objectivating knowledge which will decrease the level of tacitness. If the degree of tacitness is lower, companies can specialize more and access distinctive new knowledge.

Outsourcing is a major trend that has lead to increased use of knowledge-intensive business services. Outsourcing may lead to a higher concentration on core competences and cost efficiencies. Buying and selling knowledge-intensive business services is an area where purchasing and providing tends to differ from other goods and services, and that has had an effect on the competitive advantages gained from networks of knowledge-intensive busieness services. This study suggests that the level of standardization of a service and the tacitness of the knowledge transferred or created are the dimensions of the service that explain competitive advantage and can be derived from a KIBS network.

Services production is usually workforce intensive production, where economies of scale are not easy to realize since workforce costs increase due to increased production and few operations can be automatized. A large corporation can more easily use economies of scope, as it can utilize e.g. customer relationships and delivery channels for several services. Unit C can operate globally in a area that requires the transfer of tacit knowledge. It requires a lot of resources to collaborate with venture capitalists, but existing customer relationships can be utilized for portfolio companies, and same venture capitalists may be useful for several emerging areas and customers. A smaller company could not possibly gain the same benefits, since the maintenance of venture capitalist relationships would require the same trust-building and interaction, but the benefits are not in as many areas.

9.4 Scope and conduct of the study

The methods to carry out the study were a literature review, conceptual analysis and hermeneutical analysis on empirical data. The literature review was carried out in several parts, which was due to the scattered base of literature used. There is no single network theory, and thus there are several branches of network literature that were relevant for this study. Strategizing in business networks is also a topic which does not fall under stabilized conceptual framework, and thus all of the models have different names. KIBS companies have been studied as parts of innovation networks, and their competitive advantage has been explained as mostly relying on expert knowledge. On the other hand, there has been a significant amount of studies on KIBS that describe the special

characteristics of customer relationships of KIBS. All these branches of literature were explored, and a conceptual analysis was carried out in order to form a synthesis of the theoretical answer to the research questions.

Empirical data was collected and organized as case studies. Case studies are said to be suitable for studies that aim at increased understanding and for building theories and models, but not especially suitable for testing them. The case studies carried out were instrumental case studies, where the cases are not given in the beginning of the study, but they are selected in order to gain information on a certain phenomenon. Since this study was not testing an existing model or theory, but building a conceptual model and gaining understanding on the relations of that model, case study was a useful approach. The case study also allowed a certain amount of flexibility in the data collection, as it is easier to utilize different sources of information and less structured interviews and still brings all of the data together. This was useful since the focus of the study changed a few times during the study, but the interview questions were open-ended enough to remain similar from interview to interview.

To complement the understanding gained in the interviews on the case units, the intention was to use company documents and public sources. By using various sources the possibility of misunderstanding was diminished. Since the chosen research philosophy was social constructivism, avoiding an interviewee bias by triangulation was not considered to be a goal. When companies strategize, their decisions are made based on their construction of reality instead of an absolutely real world. Thus the views that company representatives have on the network they operate in give a picture on the environment as they perceive it, and that is of interest. However there was interviewee triangulation used in two cases since the informants were from different companies and so voices other than the ones of focal company were taken into account. The perceptions of the relationships between companies and the characteristics of transactions were not far away from each other, but the companies that solely provide services and companies that produce both service and goods, seemed to differ in their operational logic and perception of collaboration, which was an interesting finding from triangulation. Internal company documents (such as collaboration policies, contract models, and notes) and public sources (like press releases, company websites, articles and annual reports) were used to complete the picture that was gained through the interviews, and the interviews were the main source of information.

The interviews were carried out in two main phases: First in Unit A, and then simultaneously in Unit B and Unit C. The most extensive research was done on Unit A, and it built a picture of potential findings for the researcher. Unit B and Unit C were studied on a level that allowed for a deeper understanding of the knowledge gained in Unit A and by providing different angles for the study. One of the weaknesses of the data is that none of the units happened to represent transactions of clearly standardized services. Another potential weakness is the differences in the number of interviews carried out in case units, which may hinder the potential of comparing cases.

The starting point of the study is a theoretical framework, and the contribution of the study is to extend the existing theoretical framework. For a theoretical basis were selected

theories that explain the competitive advantage, and especially those, which can explain the competitive advantage in network context. The theories chosen were; transaction cost theory, resource-based view, knowledge-based view and social capital theory. Transaction cost theory explains why operations do not occur inside one hierarchy, nor do they occur solely through the market. Transaction costs affect firm size, the number of ties a firm has, and how long those ties exist. The resource-based view and knowledge-based view explain why firms differ in their ability to compete, and that is explained by resources or knowledge heterogeneity of companies, and the imperfect mobility of those resources. There are certain conditions for a resource to be a potential source of competitive advantage: they have to be valuable, rare, imperfectly imitable, and not substitutable. Collaboration is a way of accessing valuable resources that a company cannot possibly gain on its own, or which are too expensive to possess. In a collaborative network a company can gain access to such sources of competitive advantage. The knowledge-based view provides interesting insight into companies that rely on knowledge as their primary source of competitive advantage, e.g. knowledge-intensive services. Tacit knowledge is claimed to be the only knowledge that is a possible source of competitive advantage, since explicit knowledge is quickly transferred to other companies, and thus imitated. Tacit knowledge is also given as a reason why all not all transactions can be operated in a market, since a firm is much more efficient organizational form with which to create and transfer tacit knowledge than is a market. That is not only because of the opportunism, but because of the nature of tacit knowledge. Social capital theory is also used in order to understand the competitive advantage that a company can gain from its position in a network. There are two types of social capital that can be discussed: network level social capital, which expresses itself as little risk of opportunism and thus trust between parties and less costly transactions, and company level social capital, which is present in a situation where a company is a bridge over a structural hole. A structural hole position gives a company e.g. better access to new knowledge and resources and has negotiation power. Using all these theories together provides a wide theoretical base, which contains all the relevant elements for explaining competitive advantage derived from networks.

The knowledge-based view is a model which is often used when discussing competitive advantage in knowledge-intensive business services. There is more of literature when discussing services in relationship or network context. Knowledge-intensive services are described as having especially deep and long-term relationships, which are co-productive, specialized and complex with high information asymmetries. Thus a conceptual analysis was carried out due to the sources of the special characteristics of KIBS to uncover the dimensions that affect most of the competitive advantage that is derived from a network of KIBS.

9.5 Limitations of the study and implications for future research

The empirical evidence gathered was in three cases. The cases were studied from the viewpoint of the chosen focal company for each case, and the issues under study concerned the strategic choices of focal companies in their respective networks producing knowledge-intensive business services. Knowledge-intensive business services and

strategic choices were considered to be different in cases, and thus they allow learning about the dimensions of services that affect the possible competitive advantage gained in a network. These differences were not known prior the study, the cases were not as dissimilar as they could have been especially in terms of level standardization. Thus the standardization dimension may not have represented all its effects in this study. The standardization dimension can be studied further in future studies.

All of the case units were t-KIBS companies. Thus the empirical findings are generalized only to t-KIBS. If the units had included p-KIBS, it is likely that the pursuit of standardization would have been less, and strategies favoring the creation of new knowledge, building trust and reputation would have been more common. Having p-KIBS could increase understanding of the interdependences between dimensions and sources of competitive advantage in industries which do not strive for standardization. The analysis was a qualitative one. A quantitative method was not possible since the interdependences between the dimensions of service and competitive advantage that can be gained were not previously studied. A future quantitative study on the interdependencies found would be interesting.

The researcher has an effect on the results of a study. In a qualitative study there is a need for the interpretations to be based on the reserchers understanding of the theoretical framework and all the empirical material. In this study the interpretations are formed through a hermeneutical cycle, where data are analyzed iteratively and with each pass the researcher is able to come closer to a conclusion. Since the process is a cyclical, the end result contains a lot of interpretations and another researcher might have come to different conclusions. Because of the choices made by the researcher this analysis does not emphasize e.g. networked or open innovation even though that might have been the relevant issue. However, in innovation there has been a lot of research in the KIBS context, and thus that area is already quite well known.

Company documents and related articles were used by reading them by them alongside the interviews to set them in a bigger picture and to compare the sayings of the interviewees with company policies. This was done to limit researcher's misunderstanding or misinterpretation. Investigator triangulation was utilized in the study by interviewing several people on same topic, and interviewing people from different case organizations. However, the interviewees were treated as the main source of data, and their sayings were not questioned. This is because the social constructions of interviewees were considered to be of interest. The strategies created are based on these social constructs instead of on absolute facts. However that approach to data may mean the results cannot be generalized into situations where social contructions are very different.

The focal company perspective was chosen as it allows for an understanding of strategic choices of that given company. If a wider perspective on mutual strategies of a collaborative network should be understood, a focal company perspective is not necessary or even the most purposeful. A focal company perspective may limit understanding if there is a situation where strategies are created together. A wider perspective was considered, but it did not seem to be relevant in the cases under study. A study on

collaborative network strategies and competition between collaborative networks would be a possible research topic.

Using several different theoretical frameworks provides better opertunites to discover unbiased answers to research questions. There are a few frameworks that could also have been used: The theory of the growth of the firm, stakeholder theory, and intellectual capital view. The theory of growth view would have increased understanding of firm boundaries and resource usage and sharing. In this study similar issues were covered partly by a resource-based view and transaction cost economics. Stakeholder theory would have better incorporated non-business collaborators in a network and the strategies used to cope with them. Intellectual capital was intended to be used in this study since there is a pragmatic approach to intangible resources and relationships are seen as resources. However the intellectual capital view was left out since the knowledge-based view gives similar suggestions and is on a more conceptual level and is more articulate than the intellectual capital view. However the intellectual capital view would be interesting to apply to network strategy issues. In this study the number of frameworks had to be limited to allow the researcher to concentrate and focus, but the choices may have resulted to leave out some interesting interpretations.

Table 25. Generalization of results.

Result	Method	Generazible for
The Potential sources of competitive advantage in networks	Conceptual analysis	Any network
The Relationship between competitive advantage gained and level of standardization	Conceptual analysis	Service networks
The Relationship between competitive advantage gained and degree of tacitness	Conceptual analysis	Knowledge-intensive networks
Network types based on the dimensions	Conceptual analysis	KIBS networks
The Dependence of competitive advantage on the level of standardization and degree of tacitness	Case studies	KIBS networks

Table 25 presents how the results are generalized in different areas. The conceptual analysis was started in general terms of competitive advantage that it is possibly gained through a network. The dimensions defined are more specific and arise from service production and knowledge-intensity, even though there may be similar a phenomenon in goods production and less knowledge-intensive services. Network types are limited to KIBS networks, and as in case studies were of t-KIBS networks, the empirical results are limited to them. Still, the results have implications for all KIBS networks, since t-KIBS represent characteristics that are similar to KIBS in general.

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APPENDIX 1: INTERVIEW QUESTIONS

Business relationships

Do you divide your business relationships to different classes (partner, subcontractor, vendor)?

Are there non-commercial organizations with which you cooperate (universities, governmental units)?

Do you consider that the organizations you cooperate with form a whole?

Are those organizations interlinked?

How does information flow between organizations?

Partner selection and rejection

Which are the factors affecting to the decision whether a resource is critical enough to be acquired instead of partnering to gain access to it?

How conscious choices are you able to make when selecting a collaborator? Are there plenty of possible collaborators?

What kind of selection criteria there is for a potential collaborator?

What characteristics of collaborator are highlighted in collaboration (company culture, price, long-term commitment)?

What kinds of issues have lead to a termination of a business relationship?

Are you aiming at increasing numbers of collaboration in this field?

Are you aiming at several relationships or deep commitment/big volumes in some of them?

Are collaborators a source of information concerning your business environment?

What are the benefits of collaboration?

What are the downsides of collaboration?

What kind of information systems are you using with your collaborators?

Have there been clear success stories/ failures among your collaborators?

How did that reflect to your unit?

Costs of formation and maintenance of a business relationship

When building a business relationship, what kind of resources it requires from you?

a) Technical resources (technologies, development environments etc.)

b) Human resources (competence, manpower, etc.)

What resources cooperation requires if compared to doing same functions in-house?

a) What technical resources?

b) What human resources?

Transformation and transfer of competence due to the cooperation

Have any of your areas of competence been hindered due to the cooperation? Which ones?

Have any areas been strengthened? Which ones?

Have your cooperation parties developed their competences due to the cooperation?

How dependent are your activities on the competence of cooperation parties?

Are the other business relationships a partner is holding important from your point of view?

Do you limit your partner's cooperation possibilities?

Adaptations

What kind of changes has cooperation caused to your own organizations structure, activities, effectiveness, resource usage, profitability, information systems, or technologies used?

How the cooperation with your unit has affected to your cooperation parties structure or activities?

Competitive position

Who are you competing with?

Is this business unique?

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