

**IMPACT OF DISRUPTIONS ON COLLABORATIVE BUSINESS MODELS AND
INTERORGANIZATIONAL NETWORKS IN SUPPLY MANAGEMENT
- LONGITUDINAL CONTEXTUAL ANALYSIS OF THE BUSINESS NETWORKS
OF TWO FOCAL COMPANIES**

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"It is not the strongest of the species that survive, nor the most intelligent, but the one most responsive to change."

Charles Darwin

ABSTRACT

A combination of the following two observations lead to this dissertation being written. Firstly, companies that lead their industry often, over time, seem to lose some of their emblematic capability to exploit disruptions or cope with disruptive events caused by other companies. Secondly, academic as well as professional literature is filled with studies and commentaries on dynamic technology enabled network capabilities that companies can use in order to exploit rapidly arising business opportunities. The factual evidence on companies knowingly engaging in and profiting from such virtual value creation systems is, however, far more scarce. These two observations highlight the need for more information on the contributing factors affecting a company's internal as well as external abilities to collaborate and execute required transformations and adjustments, so that it is able to exploit opportunities. Therefore, the intended contribution of this thesis is to add to the knowledge on the impact of disruptions on collaborative business models and inter-organizational networks.

From its philosophical standpoint this thesis is interpretive. The research approach of the study is a longitudinal contextualist analysis deriving data from multiple sources. The case research method is used for the construction and analysis of its empirical part. And a reflective practitioner approach is used as the methodological backbone for utilizing the applicative knowledge as a source of complementary value to the theory and for the validation of the research findings.

Sources of theoretical knowledge that are most relevant for the purposes of this study may be classified into three distinct research domains: 1) *collaborative business networks*, 2), *disruptive innovation and collaborative business models*, and 3) *focal company strategy*. The analysis of the collaborative business networks highlights the different types of collaborative objectives that companies require for different types of network structures and capabilities. The chosen network typology and the role of individual economic actors within the collaboration are furthermore demonstrated to have significance for the coordination, management and performance of a collaborative network, and are thus identified as important elements to be acknowledged in the design, strategizing, and implementation of a collaborative business model.

Study on disruptive innovation and collaborative business models investigates the type, nature and effect of disruptive innovation – as an embodiment of

change – in driving and enabling changes in the collaborative business models of companies in a collaborative network. The analysis demonstrates the ability of companies to successfully manage and exploit innovation in collaboration with other companies as having a strong dependence on the collaborative business model design, network typology, and the longer-term operational sustainability and relevance of the collaborative network.

Analysis on the focal company strategy discusses the multiple meanings and comprehension of the concept and its significance for the sustainability and success of the companies individually, and as part of a collaborative network. The result of the analysis is that the dynamic nature of strategy is discovered to be often unplanned and susceptible to disruptions, which demonstrates a need for careful planning, strategizing, implementation and management by all the partners in a network. Furthermore, this needs to take place on all the levels of a collaborative network to ensure that the necessary strategic flexibility and operational sustainability can be achieved.

The theoretical contributions of this study include further illustration on the usability and value of longitudinal contextual analysis in describing change in its organizational and social context. In addition, the concept of technology frames and the process of framing are demonstrated to yield value for the design, implementation, and evaluation of inter-organizational collaboration. The findings of the thesis present the, so called, network phenomena as a holistic change process that impacts on the individual and collaborative strategies of companies and their business models. For its practical contribution, this study provides an empirical comparison of the two distinct approaches that the investigated focal companies adopted for the establishment of their networked collaboration. It furthermore introduces a classification of the disruptions that have an effect on the investigated focal companies' business models and their inter-organizational supply networks. The results of the longitudinal contextual analysis signify the collaborative business model design, the network structure, and the nature of the collaboration to influence the capability and willingness of a company to participate in business model transformation- and for these to play a role in the success and sustainability of the networked collaboration.

Keywords: Disruptions, discontinuities, disruptive innovation, business models, collaborative business networks, focal company strategy

TIIVISTELMÄ

Disruptioiden vaikutus yhteistoiminnallisiin liiketoimintamalleihin ja yritystenvälisiin tarjontaketjuihin – kahden naparyrityksen liiketoimintaverkoston kontekstuaalinen pitkittäistutkimus

Seuraavat kaksi havaintoa johtivat tämän väitöskirjan kirjoittamiseen: Monissa tapauksissa teollisuudenalojen johtoyritykset näyttävät ajan kuluessa menettävän ainakin osan leimallisesta kyvystään luoda, hyödyntää sekä mukautua disruptioihin. Toiseksi, huolimatta laaja-alaisesta akateemisesta tutkimuksesta ja moninaisista ammattikirjallisuudessa esitetyistä puheenvuoroista, käytännön esimerkit tilanteeseen räätälöityjen, dynaamisten, teknologiatuettujen verkostojen käytöstä uusien, usein nopeasti ilmaantuvien, liiketoimintamahdollisuuksien hyödyntämiseksi ovat harvemmassa. Johtopäätöksenä näistä havainnoista onkin se, että lisätietoa tarvitaan niistä asioista, jotka myötävaikuttavat näihin yritysten sisäisiin ja ulkoisiin kyvykkyyksiin mukautua yhteistoiminnallisten liiketoimintamallien edellyttämällä tavalla ennalta asetettujen tavoitteiden saavuttamiseksi. Tämän työn tarkoituksena on näin ollen lisätä tietoa disruptioiden vaikutuksista yhteistoiminnallisiin liiketoimintamalleihin sekä yritystenvälisiin verkostoihin.

Tieteenfilosofisesta näkökulmasta tarkastellen tutkimuksen viitekehys soveltaa tulkitsevaa lähestymistapaa. Menetelmällisesti tutkimusta voidaan parhaiten luonnehtia sisällölliseksi pitkittäistutkimukseksi. Asetettuihin tutkimuskysymyksiin vastatessa työssä hyödynnetään useita eri tietolähteitä. Empiirisen tiedon osalta väitöstutkimuksessa sovelletaan tapaustutkimuksen menetelmiä. Käytännön työkokemuksesta syntyneen ammatillisen osaamisen ja näkemyksen hyödyntämiseksi sovelletaan lisäksi ns. 'reflektiivisen ammattilaisen' (eng. reflective practitioner) lähestymistapaa teorian tiedon täydentäjänä sekä tutkimustulosten vahvistamisessa.

Tutkimuksen kannalta oleellimmat, vaikkakin osin päällekkäiset, teoreettiset tiedonlähteet voidaan luokitella kuuluvan seuraaviin kolmeen tutkimusalueeseen: 1) *yhteistoiminnalliset liiketoimintaverkostot*, 2) *disruptiiviset innovaatiot ja yhteistoiminnalliset liiketoimintamallit* sekä 3) *liiketoimintaverkostoja johtavien yritysten strategia*. Yhteistoiminnallisten liiketoimintaverkostojen osalta työssä arvioidaan yritystenväliselle yhteistoiminnalle asetettuja vaatimuksia muun

muassa tavoitteiden ja kyvykkyyksien näkökulmasta. Tutkimuksessa havainnollistetaan eri yhteistoimintaa varten rakennettujen yritysmuodostelmien vaativan erilaisia rakenteita sekä kyvykkyyksiä riippuen niille asetetuista tavoitteista. Valitun verkostotypologian ja yksittäisen osallistujan rooli, itsenäisenä taloudellisenä toimijana, nousee esiin merkittävänä tekijänä yritysmuodostelman sisäise yhteistyön sekä tehokkuuden kannalta.

Disruptiivisten muutoksien ja epäjatkuuustekijöiden vaikutusta yhteistoiminnallisiin liiketoimintamalleihin analysoidaan erityisesti disruptiivisen innovaation näkökulmasta. Analyysin ulostulemana korostuu yhteistyötä määrittelevän liiketoimintamallin, liiketoimintaverkoston typologian, yhteistyötä harjoittavien eri toimijoiden välisten keskinäisten riippuvaisuussuhteiden sekä yhteistyön pysyvyyden osaltaan vaikuttavan yritysten kykyyn yhdessä tuottaa, hallita sekä hyödyntää innovaatioita.

Tässä työssä analysoidaan eri näkökulmista yritysten tarvetta strategiamuutoksiin ulkopuolisten disruptioiden tai sisäisten tavoitteiden vuoksi. Lisäksi analysoidaan strategian merkittävyyttä yhteistoiminnallisille liiketoimintamalleille. Keskeisenä löydöksenä tutkimuksessa tunnistetaan tarve strategian dynaamisen luonteen huomioimiselle liiketoimintaverkoston suunnittelussa ja toiminnassa. Liiketoimintaverkoston toiminnan kannalta on tärkeää huolehtia strategian yhteistoiminnallisten liiketoimintamallien eri tasojen olevan linjassa sen strategisten tavoitteiden kanssa.

Väitöskirja tuottaa tieteellistä kontibuutiota lisäämällä ymmärrystä disruptioiden vaikutuksesta yritysten strategiaan sekä yhteistoiminnallisiin liiketoimintamalleihin. Erityisesti työ havainnollistaa sisällöllisen pitkittäistutkimuksen käytettävyyttä näiden em. muutoksien kuvaamisessa tietyissä ennaltamääritellyissä liiketoiminnallisissa viitekehyksissä. Tämän lisäksi työ tarjoaa uutta tietoa ns. teknologiakehysten (eng. Technology frames) käytöstä strategiaprosessin tukena yritystenvälisen yhteistoiminnan arvioinnissa sekä rakentamisessa. Käytännön kontribuutioon väitöstutkimus tuottaa empiirisen vertailun kahden yrityksen valitsemista eri lähestymistavoista oman liiketaloudellisen yhteistoimintaverkostonsa rakentamiseksi.

Avainsanat: Disruptiot, epäjatkuvuuskohdat, disruptiiviset innovaatiot, liiketoimintamallit, liiketoiminnalliset yritysmuodostelmat, strategia

ESIPUHE

Tämän työn lähtölaukaus ajoittuu tammikuuhun 2001, jolloin olin juuri aloittanut maisteriopintoni Jyväskylän yliopistossa. Yllätyksekseni tavattuani uuden oppiaineeni professorin ensimmäistä kertaa huomasin paitsi aloittaneeni opinnot, myös vastaanottaneeni työtarjouksen eräässä hänen johtamassaan yritysprojektissa. Tuosta työsuhteesta alkoi tähän mennessä jo reilusti yli kymmenen vuotta kestänyt matkani nopeasti kehittyvän teollisuudenalan parissa, ja myös jatko-opintoni tohtorin tutkinnon suorittamiseksi. Elämän suuret asiat sekä saavutukset tuntuvat aina tarvitsevan paitsi näkemystä, tahtoa, vaivaa ja viitseliäisyyttä niin myös aimo annoksen sattumaa. Näin on laita myös tämän väitöskirjan kanssa. Valehtelisin, jos väittäisin ymmärtäneeni vuosituhannen alussa mihin olin ryhtymässä, tai tämän valmiin lopputuleman olevan lähimainkaan sellainen kuin joksi sen silloin ajattelin muodostuvan. Katsoessani ajassa taaksepäin huomaan kuitenkin että näin tämän kaiken pitikin mennä. Tässä yhteydessä tahdon erityisesti kiittää seuraavia erityislaatuista henkilöitä sekä tahoja siitä runsaasta avusta josta tätä työtä tehdessäni olen saanut nauttia.

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1 INTRODUCTION

This chapter describes the phenomenon of interest and provides the reader with insight into the motivation for this thesis. It begins with a description of the background for to the topic of interest and continues with a short review of industry changing disruptions, which are evaluated through some illustrative examples that provide the taxonomy for the disruptions covered in the scope of this thesis. The purpose of the review is to provide the reader with an understanding of the types of disruptions and the overall phenomenon this thesis discusses. The chapter continues by describing the research framework governing this thesis and by laying down its objectives to describe the intended contribution of the thesis to the existing body-of-knowledge. Towards the end of the chapter, the structure for the dissertation is illustrated, and the detailed research objectives and research questions are described. It ends with some concepts that are central to the thesis being introduced and defined.

1.1 Phenomena of interest

In the post-industrialized 21st century many industries have faced the challenge of rapid change in their industrial environment (Sabel & Saxenian 2008; Ali-Yrkkö 2010; Heikkilä 2010; Lehti, Rouvinen & Ylä-Anttila 2012; Doz & Kosonen 2013). These changing conditions often result from the realization or the anticipation of disruptions.

Disruptions may be considered the embodiments of change, or temporally as a continuous process (Pettigrew 1990a; Christensen & Raynor 2003). There are, naturally, many embodiments and sources of disruptions, ranging from evolving maturity and the saturation of markets over time (Markides 2006; Crockett, McGee & Payne 2013) to technological change and improvements (Christensen 1997; Markides 1997, 2006; Lyytinen & Rose 2003; Heikkilä 2010); from digitalization and convergence (Doz & Kosonen 2013) to new technology enabled distribution channels (Lehti et al. 2012), to name but a few.

Within an economic context, radical changes often emerge through the introduction of various forms of discontinuities, for example, disruptive innovations (Christensen 1997; Christensen & Raynor 2003; Govindarajan & Kopalle 2006)

may impact on organizations at the level of company strategy and the business model (Kim & Mauborgne 2006; Markides 2006; Chesbrough 2003, 2007, 2010; Sabatier, Craig-Kennard & Mangematin 2010; Sandström 2010; Teece 2010; Carayannis, Sindakis & Walter 2014), products (Markides 2006; Sainio & Puumalainen 2007; Sainio, Ritala & Hurmelinna-Laukkanen 2012) or IT, among other things (Lucas & Goh 2009; Lyytinen & Rose 2003).

Scholars have coined many ambiguous terms for the type of innovation that is capable of significantly, or even radically, altering the prevailing technological, regulatory, environmental, or market status quo of industries. Common to the terms and concepts of disruptive innovation¹ (Christensen 1997; Christensen & Raynor 2003; Govindarajan & Kopalle 2006; Sandström 2010), radical innovation² (Kim & Mauborgne 2006; Bouwman, MacInnes & de Reuver 2009; Sainio & Puumalainen 2007; Sainio et al. 2012), and discontinuous innovation³ (Anderson & Tushman 1990; Sandström 2010) is their expected capability to create a “discrete and momentous shift related to a firm’s competence base or network” (Sandström 2010, p. 3).

Detailed definitions for the above terms and the specifics of the nature of innovation differ. While acknowledging the conceptual ambiguity of the various adjectives associated with the generic concept of innovation, this doctoral dissertation uses the terms disruptive innovation, discontinuous innovation, and radical innovation rather interchangeably. The discontinuity inflicted by any technological innovation in a market, or in the governance and regulatory environment of companies, depends on the manner in which it is executed as part of a company’s business model and/or how it is delivered to the marketplace. As such, regardless of the adjective conceptually utilized to describe an innovation at the time of its

¹ Some scholars, such as Anderson & Tushman (1990) and Sandström (2010), consider ‘disruptive innovation’ a sub-set of discontinuous innovation.

² Some conceptual ambiguity exists in the use of the various prefixes used in conjunction with the term ‘innovation’. For example, Sandström (2010, p. 12) makes a distinction between ‘disruptive innovation’ and ‘radical innovation’ based on the former being a type of innovation powerful enough to inflict change as a point of discontinuity in a technology, market, or industry. The latter he describes (*ibid.*, p. 3) as a concept that may be associated with performance improvements that, as such, may not necessarily be discontinuous or disruptive. Sainio & Puumalainen (2007, p. 1317) associate the concept of ‘radical innovation’ with the variables they describe as the ‘disruptiveness potential [of innovation]’ and the ‘strategic importance [of innovation]’ to the firm. They furthermore posit that radical [technological] innovation, in terms of its technological and strategic importance for the firm, drives radical business model changes (*ibid.*, p. 1318).

³ In some of the earlier literature the concept of ‘disruptive innovation’ is mostly associated with technological innovation (Christensen 1997). More recently the concept has increasingly been extended to consider the effects of disruptive innovations on companies’ business models (Chesbrough 2003; Christensen & Raynor 2003; Markides 2006; Sandström 2010). In this thesis the concept of ‘disruptive innovation’ is holistically considered as the embodiment of (any such) ‘disruption’ that is powerful enough to cause discontinuities and catalyze changes over the distinct levels of technology, markets, and regulation.

conception, a disruptive innovation that is factually capable of causing a discontinuity is considered to have been ‘disruptive’ and ‘radical’.

Disruption is, in this doctoral dissertation, categorically considered as a generic term for a deliberate, or unintended, embodiment of change, such as an innovation, that affects the operations of companies. These disruptions are dependent on the industry specific conditions and attributes, for example, technology, regulatory environment, competitive environment, etc., that allow the (industry) context to dictate the perceived or realized causality and severity associated with the particular disruptions in question (Bouwman et al. 2009). As such, disruptions serve as a point of punctuation (Newman & Lyytinen 2008) or discontinuity (Sandström 2010) that results in companies – in their creation or in their response – planning and altering their course, or to choosing not to do so.

Disruptions as such cannot be labeled as either beneficial or detrimental due to their impact being fully dependent on the characteristics of their type and nature (Markides 2006; Sabel & Saxenian 2008; Baiyere & Salmela 2013), their scope (Christensen 1997; Christensen & Raynor 2003), and the effect these disruptions have in and for the market place (Bouwman et al. 2009; Sainio et al. 2012). Disruptions may render their existing competencies, resources and other company assets obsolete (Tushman & Anderson 1986), whereas the severity and consequence for an individual company is often dependent on the course of action a company, or a network of companies, takes or leaves untaken.

For some companies, the changes arising from disruptions result in new business opportunities and increased revenues. For some, such as Kodak (see Lucas & Goh 2009), the results of the disruptions were disastrous. Due to these quite polarized outcomes, all companies hoping to fully exploit the opportunities of a disruption in a dynamic market place need to have agility (Rajala, Westerlund & Möller 2012; Doz & Kosonen 2013). This agility – in response to disruptions – inherently contains the requirement that companies possess the capability to rapidly sharpen, focus or re-engineer their business models. Business models being the blueprint describing the value creation logic and setup of companies and networks alike, as well as describing the premises for their operations and collaboration (Chesbrough & Rosenbloom 2002; Sabel & Saxenian 2008; Bouwman & Fiel 2008; Bouwman et al. 2009; Sainio et al. 2012).

One distinctive and visible change in the post-industrialized world and in saturated markets has been the growth of the significance of providing services as a source of new or complementing revenues for companies (Bouwman & Fiel 2008; Lehti et al. 2012). In fact, commercializing new services and solutions for customers either alongside traditional product-based business or as a totally standalone line of business has, in many instances, become the cornerstone for

many companies long-term strategy and success amidst changing markets (Bouwman & Fielt 2008).

Especially in industries sensitive to economic fluctuations, such as in the pulp and paper industry and in the mining industry, the importance of service industries continues to grow (Sabel & Saxenian 2008). In these industries demand for service business related company offerings has, in some market areas, already surpassed, or is fast surpassing, the importance of traditional company products as a source of new and recurring revenue (Lehti et al. 2012). Succeeding in the service business sector often requires the collaborative input of many teams, units or partnering companies. Hence, the previous business models of companies are increasingly becoming insufficient for coping with the changing needs of value creation and value delivery (Doz & Kosonen 2013), and thus the need for new business models has increased (Chesbrough 2007; Teece 2010; Dagnino & Longo 2012).

Changes in the modern market place have and continue to require mandatory changes be made to the value creation logic of companies. Consequently, companies are increasingly forced to rapidly adapt their operations, build the required flexibility into their operations as well as their core business processes and operative execution, reach out to and partner others, and find new complementary market opportunities to sustain growth (Ring & Van De Ven 1992; Bouwman & Fielt 2008; Bouwman et al. 2009; Lehti et al. 2012; Rajala et al. 2012). For the focal company – being the company that acts as the leader of the collaborative network operations – these transformations, which are made in response to disruptions, need to be made to their value creation logic and to their related structures as well as to each individual level of each individual company in the collaborative network, as well as to the collaborative network itself (Heikkilä, Reijonen & Vahtera 2004; Heikkilä, Tyrväinen, Heikkilä 2010; Heikkilä 2010).

Disruptions force firms to focus on as well as to rethink their core competencies⁴ (Hamel & Prahalad 1994), and to acquire access to needed additional resources and capacity from elsewhere, for example, by engaging in collaborations to exploit service innovations with other companies (Bouwman & Fielt 2008; Heikkilä 2010). Needless to say, these changes pose huge requirements for individual companies and for the intercompany partnerships.

From an operative viewpoint, the requirements for significant flexibility drive and force companies to use outsourcing as means for acquiring needed competencies, skills and capacity to satisfy market demand. On a more strategic level, it drives companies to gear towards and build collaborative business models based on partnering other companies. Clemons, Reddi & Row (1993, p.1), describe this

⁴ Hamel & Prahalad (1994, p. 199) define core competencies as “a bundle of skills and technologies that enable a company to provide a particular benefit to customers”.

trend of companies to “move to more outsourcing but from a reduced set of stable partnerships” as the move to the middle hypothesis.

The level of power, control and trust of companies becomes inevitably affected as firms adopt leaner, more cost efficient organizational structures through the use of collaboration and outsourcing in order to focus on their individual core competencies (Heiskanen, Newman & Eklin 2008; Heikkilä 2010). As a result, interdependence of the companies grows (Thompson 1967; Kumar & Van Dissel 1996), making the management and operability of cross-unit relationships crucial for the successful execution of a company’s own strategy as well as their collaborative strategy (Hutt 1995; Heikkilä 2010).

The need to acknowledge the differences and distinct requirements that operating in a product-based business – such as device manufacturing, rather than a service business, such as operating and maintaining facilities and equipment – imposes on an organization’s business model is critical for the long-term success of companies. In this thesis, the product and service paradigms are researched through the evaluation of case studies and by examining the effect and causality of some past industry disruptions on the networked business model requirements of companies. The cases and the description of their significant contribution to the context area will be explained in detail later in the thesis.

1.2 Short review on the taxonomy of industry changing disruptions

This thesis draws its conclusions from empirical evidence and information derived from the study of the two business networks that the focal companies of this research operate in: the pulp and paper industry and the mobile phone industry. Next, a brief review is provided to describe the author’s motivation for the research topic and to help the reader better understand some of the changes that have shaped the industries and networks of this research.

The disruptions considered in this chapter are distinctive and easily identifiable from a macro-economic viewpoint. These examples are used to highlight some of the major changes that have affected companies and networks, resulting in change in the value creation logic of companies and how the execution of their operations is performed. The following is loosely based on the works of Bouwman et al. (2009), and the disruptions identified here are categorized as stemming from changes in one of the following three broad categories: 1) changes in governance and regulation, 2) market and societal changes, and 3) technology changes.

- Governance: competitive barriers due to market governance and financial politics,
- Market and societal changes: becoming visible as changes in the market and market areas. For example, changing societal needs or socio-economic factors that require specific changes or a targeted approach in the execution of operations by companies or in their capabilities. Examples include diverging customer demand in segregated market areas, which can drive or force new requirements for the localization of a company's offerings, i.e. the range of their product mix,
- Technological changes: such as those characterized by advances in technology and increases in market maturity, which drive the demand for change or create new types of demand for bundled and more complex solution offerings.

1.2.1 Governance related disruptions

In many industries the markets have traditionally been shared and dominated by a few individual companies. Such a dominant position may well have resulted from product or cost superiority but this has not often been the case. There have traditionally been significant differences in the perceived strategic importance of different industries in various countries that have an effect on the competition within that specific industry. In many cases, the market dominance of one company has been gained with the help of government subsidiaries or fiscal decisions, or enforced legislative or regulatory barriers to competition.

For example, in the period after the Second World War, up until Finland joined the European Union, the Finnish government frequently used financial politics as a mean to devalue currency to boost foreign exports. One of the industries that benefited from this was the Finnish pulp and paper industry, which was able to exploit both the government's supporting measures and the country's vast and available raw materials, thus growing into a major player on a global scale. Since then, the Finnish pulp and paper industry has, on numerous occasions, served as an example of an industry forced to transform itself due to factors including, but not being limited to, common European fiscal politics, which limit the opportunities individual countries have to exercise independent fiscal politics and simultaneously increase their native industries' competitiveness.

Figure 1 illustrates the overall development of the forest industry between 1975 and 2010, providing the reader with a view of the development of the pulp and paper industry within its larger context area – in terms of its monetary value and as a percentage of Finnish gross domestic product (GDP).

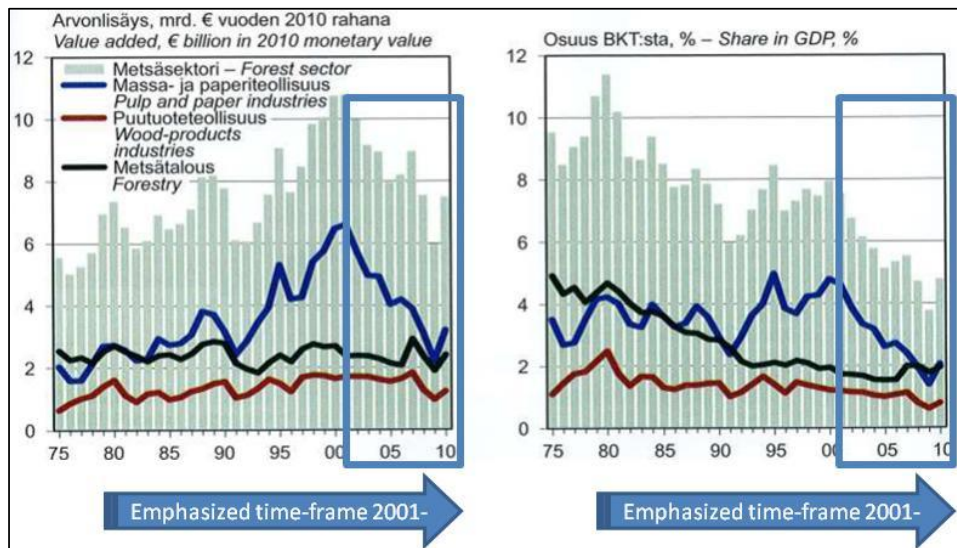


Figure 1 Development of the Finnish pulp and paper industry 1975-2010 in terms of its monetary value and as a percentage of Finnish GDP (Source: Kniivilä 2011) ⁵

As Figure 1 shows, the percentage share of the pulp and paper industry between 1995 and 2010 decreased from a 4% share of GDP (1995) to 2%. There is no single reason behind the decrease, rather it is a result of many simultaneous disruptions. Such disruptions are the shift in global economic growth from Western to Eastern nations – especially the emergence of China, and the increase in customer demand in the developing market areas. In addition, the increased use of electronic communications as a substitute for printed media, plus technology enabled possibilities to better exploit new and alternative raw material sources, like wood plantations, have contributed towards the structural change in the pulp and paper industry (Kniivilä 2011).

⁵ Translated from the report "Suomen kemiallisen paperi- ja massateollisuuden nykytilanne ja tulevaisuuden näkymät". Webpages of Metsäkeskus <http://www.metsakeskus.fi/sv_SE/c/document_library/get_file?uuid=4fe596b5-ee47-47c8-99b6-ed8a41b689bc&groupId=10156>, retrieved 2.5.2013.

1.2.2 Market related disruptions

Disruptions in market dynamics, such as changes in customer demand patterns, also force companies to adapt. For example, mobile handset device manufacturers in the early 21st century were able to create market demand for their products by pushing new innovations or improvements to existing products onto markets. At this time the availability of the features the handsets possessed was much more limited than today, plus the main feature of a mobile device was its capability to call while moving around. The demand for mobile devices high was in unsaturated markets and the products sold in large quantities and with little variation between the competitors' products.

Since those days, the mobile market dynamics have significantly altered. From a global perspective, the mobile industry has become increasingly mature, competitive and polarized from both the viewpoint of geographical and consumer requirements (Ali-Yrkkö 2010; Lehti et al. 2012; Doz & Kosonen 2013). Mobile devices are no longer the privilege of a wealthier population, but are an everyday necessity for everyone. At the same time, market offerings and competition have significantly increased and many specific niche markets are today being served by highly localized features and offering.

1.2.3 Technology as a source of disruptions

An example of market specific differentiation requirements resulting in disruptions is illustrated next. In many developing countries, the demand for multi-SIM capable mobile devices is high due to reasons such as technical infrastructure limitations affecting network coverage (representing technology disruption), operators owning and dictating the cost for the use of their networks (representing regulatory disruption) and the amount of available income that mobile subscribers can use on the services of specific network operators (representing market disruption). These disruptions, in the form of cost and availability issues (roaming charges, network coverage and consumers aim for cost optimization), result in the market demand for consumers to hold more than one mobile subscription and to frequently want to switch between the mobile service providers' networks in specific locations and for specific purposes. At the same time, the demand for these multi-SIM devices is – in the absence of these specific environmental conditions (embodied as disruptions) – virtually non-existent in many of the more developed countries.

That example highlights how different market conditions may impact on the perceived impact of disruptions and create very specific demand requirements for a market and segregation between market segments. For companies and networks

alike, succeeding in these markets calls for the specific understanding of a market's characteristics and dynamics, an understanding which, furthermore, must be reflected in several companies' (joint) offering – in order for the offering to be relevant to attract customers.

1.2.4 Company level effect of disruptions

The current and anticipated disruptions force companies to seek out ways to optimize their cost structures as well as the method they assume when fulfilling the company's strategic intent. As was discussed earlier, this optimization often results in companies focusing on their core competencies and moving into collaboration and the outsourcing of other non-core, functions and tasks. Below two quotes by Metso Paper nicely summarize the discussion by providing statements on the causes and actions Metso Paper took to restructure their company's operations and business model in order to counter changes in the business environment, and maintain the overall sustainability of the company.

Personnel reductions are necessary because of the need to adjust the manufacturing capacity of Metso's paper business unit to the permanent structural changes that have impacted the business and weakened its competitiveness and profitability. The main factors here have been the ongoing reduction in the demand for paper machinery, increasing demand for cheaper solutions, growing competition... The general climate of uncertainty in the global economy has also affected the paper industry's appetite for new investments ... The aim of the personnel reductions is to bring production capabilities in line with current and expected demand, and secure Metso's global competitiveness over the longer term. A lighter operational cost structure and greater flexibility is essential. Outsourcing some operations will also improve Metso's ability to adapt to changing workloads and focus on its core business. (Metso Stock Exchange Release, 18th of September, 2012)⁶

⁶ Metso stock exchange release 18th of September, 2012 "Metso to adjust its Finnish operations in response to structural change and weaker demand in the paper industry", available: <<http://www.metso.com/news/newsdocuments.nsf/Web3NewsDoc/9285DBBD09CAC312C2257A7D0023CA14?OpenDocument&ch=ChMetsoWebEng&id=9285DBBD09CAC312C2257A7D0023CA14&>>, retrieved 27 May 2013

A more profound viewpoint into the matter, specifically acknowledging the role of technology disruptions and market disruptions becomes visible from the comment of the president of Metso's Pulp, Paper and Power business. In his statement, he reflects on the structural change in the pulp and paper markets, highlighting the role of service businesses as a way of complementing revenue sources and building on the company's existing base:

The gains made by new communications technologies have weakened growth in the consumption of printing and writing paper ... The medium-sized machine segment is also of interest to smaller suppliers, which makes competition here particularly tough ... We have to be able to produce cheaper, quicker, and more flexible solutions to survive in this market... Metso's vast installed base will offer us opportunities to further develop our service business. (Pasi Laine, President of Metso's Pulp, Paper and Power business)⁷

In response to disruptions, companies redefine and sharpen their strategic intent. These strategy revisions often trigger changes that are to be made to their business models. As such, these changes may prompt actions on the level of the company (internal changes) or within a wider networked context (inter-organizational changes).

Metso Corporation, for one, has gone as far as to acknowledge its current organizational structure poses limitations to the execution of its optimized strategy and the agility of the company as a whole. In response, Metso corporation at the end of year 2013, completed a demerger where its Pulp, Paper and Power business unit were separated from Metso Corporation, becoming a separate listed company called Valmet,

What is interesting about the demerger is its motivation and the drivers resulting in change. As Metso CEO Matti Kähkönen points out, these drivers were related to the distinct requirements concerning the earlier business units' strategy optimization and organizational agility:

"I am convinced that both our customers and our personnel – both in the Pulp, Paper and Power businesses and in the Mining and

⁷ Quotation adopted from Metso stock exchange release 18th of September, 2012 "Metso to adjust its Finnish operations in response to structural change and weaker demand in the paper industry". Available:

<<http://www.metso.com/news/newsdocuments.nsf/Web3NewsDoc/9285DBBD09CAC312C2257A7D0023CA14?OpenDocument&ch=ChMetsoWebEng&id=9285DBBD09CAC312C2257A7D0023CA14&>>, retrieved 27 May 2013

Construction and Automation businesses – would benefit from the independent governance and strategy that two separate companies would offer. Both Valmet [name for the demerged Metso Pulp, Paper and Power business unit] and Metso would be sizeable, globally leading businesses with strong balance sheets. Strengthening their respective cultures, goals and agility to execute their strategy through a demerger would enable them to realize their full potential in the future”, Matti Kähkönen, Metso’s President & CEO, 2013⁸

An overview of Metso’s current business along with a brief description of the segments referred to is shown in Table 1.

⁸ Quotation taken from Metso stock exchange releases 31st of May, 2013 “Metso’s Board approves a demerger plan to divide Metso into two companies”. Available: <<http://www.metso.com/news/newsdocuments.nsf/Web3NewsDoc/0AE5C79C18A3B488C2257B7C001F7738?OpenDocument&ch=ChMetsoWebEng&id=0AE5C79C18A3B488C2257B7C001F7738&>>, retrieved 17 June 2013.

Table 1 Introduction of Metso's businesses and the demerger setup to separate Pulp, Paper and Power business unit into a separate listed company (modified from the webpages of Metso)⁹

ORGANIZATION AFTER DEMERGER	Metso Corporation		Valmet Corporation
SEGMENT	MINING AND CONSTRUCTION	AUTOMATION	PULP, PAPER AND POWER
NET SALES (2012)	3492 MEUR	859 MEUR	3014 MEUR
SHARE OF ORDERS RECEIVED (2012)	50%	12%	36%
SERVICES NET SALES	1692 MEUR	380 MEUR	1102 MEUR
SERVICE BUSINESS' SHARE	52% (of orders received)	49% (of orders received)	46% (of orders received)
PRODUCTS AND SERVICES	Full scope solutions for mining industry	Process automation and information management application networks and systems	Pulp mills and solutions
	Grinding mills, grinding solutions	Valves, intelligent positioners and intelligent condition monitoring	Paper board and tissue making lines, machines and rebuilds
	Crushers, crushing solutions		Power boiler plants, biomass power plants and rebuilds
	Process equipment (pumps, filters, thickeners, separation equipment)	Process measurement systems and analyzers	Maintenance and expert services
	Expert and maintenance services	Expert and life cycle services	Spare and wear parts
CUSTOMERS	Mining industry	Power generation industry	Chemical and mechanical pulp producers
	Construction industry (quarries and contractors)	Oil and gas industry	Paper, board and tissue producers
	Scrap yards, waste handling companies and recycling	Pulp and paper industry	Industrial power generators, municipalities and utility companies
		Mining and construction industry	
		Other selected process industries	
OPERATING MODEL HIGHLIGHTS	Engineering and management of delivery projects in mining equipment. Final assembly of components supplied by subcontractor network in construction equipment. Manufacturing (mainly inhouse production) of spare and wear parts.	Valves and positioners assembly in (mainly) own factories. Management of cost-optimized supply chain (purchasing and components availability management). Process and automation solutions as based on internal engineering knowledge.	Engineering and assembly of paper, board and tissue machines inhouse. Fiber business line solutions focusing primarily on engineering and delivery project management. Manufacturing of fabrics and paper machine clothing inhouse. Power industry products focusing on engineering and project management.

⁹ Graphics taken from the webpages of Metso Corporation. Available: <http://www.metso.com/reports/2012/assets/files/PDF/matriisit/metsos_businesses12.pdf>, retrieved 17 June 2013.

What is noteworthy in the case of the Metso demerger, illustrated in Table 1, is that the structure of the organizations – Mining and Construction & Automation under Metso Corporation; and Pulp, Paper and Power as Valmet Corporation – highlight the strategy requirement differences between the segments. Whereas the operating models of all three former Metso Corporation segments contain significant similarities to illustrate economies of scale, the differences between the segments' market maturity and their expected future growth potential and associated capability requirements differ significantly. Past, present and future (expected) economic realities, combined with industry changing disruptions are changing both the markets and the industry itself, depriving it of synergies between the segments and resulting in the need for separate strategies, and naturally, business models and possible collaborative arrangements.

Such changes are visible in other industries. In the mobile phone industry, high-end (smart phones) and low-end (feature phone) product segments have become increasingly segregated. This development has highlighted the need to differentiate between market areas and product segments while simultaneously maintaining a large customer base and sales volumes, which remains a must in order to achieve and exploit economies of scale for competitive advantage. Economies of scale have become increasingly invaluable in situations where gross margin per product is typically low or decreasing. Large production volumes can, in these instances, be used to provide competitive cost advantage over competitors and enable delivery channels and manufacturing capacity to be optimally utilized for the transaction cost per device (cost of manufacturing and cost of goods sold) to be minimized.

Hence, global markets continue to consolidate, while locally the demand within market areas is increasingly segregated. As Valkokari, Paasi, Luoma and Lee (2009, p.1) point out:

“The success of the firm depends on its strategic collaboration with other organizations that influence the creation and delivery of its products and services.”

The growing demand for various operating and maintenance services in the pulp and paper industry drives networked collaboration as means to generate new revenue streams, commercialize associated services and to provide customers with the services they need and desire.

These requirements and the factors contributing to the successful operation of a company's networks are what this thesis researches.

1.3 Motivation and the need for research

The question that inspired this thesis is:

Why is it that some companies succeed in performing the required transformations to survive or even benefit from disruptions while other companies fail?

It would be simple, albeit shortsighted, to claim an individual disruption or a characteristic of a certain industry as the root cause of the phenomenon the above question seeks to uncover. After all, we do have abundance of industry examples where companies, for example, Apple Inc., have been able to use industry segmentation (the reader should consider smart phones a disruptive innovation) to its benefit, whereas the former market leader, Nokia Corporation, failed in its attempts. Likewise, all of the Finnish pulp and paper industry has faced the same structural change in their industry, but still we can identify clear differences in the competitive success, placement and future outlook of companies in the market place.

Since we cannot pinpoint the answer in any one specific disruption or industry, intuitively what follows is the need to look at the individual firms themselves. What is it that propels some companies' individual success? Some would argue the answer is found in the goods and products a company manufactures and delivers. Others would assume a wider perspective and stress the importance of the perceived total value offering a company – perhaps in addition to plain tangible goods – is capable of presenting to its customers.

One does not need to continue this thought process long before once again hitting a dead end. With regard to our mobile industry example, Apple Inc. does not manufacture its physical products itself, although the company is famous for those and is more than capable of delivering a multitude of both tangible and intangible goods to the market place. Likewise, Apple Inc. does not itself create every component, such as product enhancements, software applications, solutions, services and content, which makes up its total customer value offering. So again, if the answer is not in the abilities of individual companies, what remains to be argued for as the recipe for success?

The answer lies not in the inherent abilities of any one company alone, but in the collaboration of companies. These collaborative Value Creation Systems (VCS) are capable of delivering value to markets and to customers that exceeds the sum of the value of the independent participants. As such, these VCSs may not only serve in response to, but as a source of disruption that can further change their markets and even industries. What this leads up to, is that the success of individual companies, at least in certain competitive markets, has become

dependent on both the capability of a company to operate and execute its own core competencies, as well as its ability to perform in, collaborate within and benefit from a VCS or even VCSs.

As the big picture begins to form and come into focus, an observant reader will still find the process of thought – in its presented form – inconclusive. Collaborative VCSs, such as supply chains or intercompany alliances are not a new thing nor are these exclusively found in only certain industries. Companies are – across industries and locations – competing and collaborating in various manners and in many inter-organizational formations. What is more, some of these companies and VCSs are indisputably more successful than others, and some do not succeed at all.

Therefore, it is logical to claim and research, that not all collaborative VCSs are the same. In fact, in certain industries, such as in the pulp and paper industry and the mobile industry, these collaborative VCSs have evolved from traditional network structures to take on forms capable of transforming existing industry boundaries. It is equally logical to continue by claiming that the sustainability of successful collaborative VCSs comes from success factors other than those associated with more traditional supply chains or intercompany alliances. It is from these standpoints and the above beliefs that this doctoral dissertation sets forth to provide new answers to the question raised at the beginning of this chapter.

While it would be more than fortunate and a welcome turn of events, this doctoral dissertation does not expect to find universal answers to the questions it presents. Furthermore, due to the limitations of the empirical evidence and the area of expertise, the focus and scope of this work is limited to two focal companies and their business networks, both of which operate in their own distinct industry.

This doctoral dissertation aims to contribute scientifically by adding to the existing knowledge and literature on business models, i.e. the effect of disruptions on a company's individual and collaborative strategies as well as on business models and intercompany networks. The pragmatic contribution this work aims to provide is to identify and pinpoint some of the topics and issues that current business managers and leaders should probably acknowledge and plan for when engaging in collaboration with other companies.

1.4 Theoretical background

The mechanisms for understanding, modeling, managing and optimizing various VCSs are investigated in a multi-disciplinary fashion in many fields of science, ranging from the natural sciences to mathematics, and from engineering to the

social sciences. The diversity of the research practices and viewpoints is visible within different academic disciplines.

In the discipline of organizational studies, research on the different applications of VCSs has been extended to cover issues ranging from the generic study of networks themselves as a change paradigm (Achrol 1997) to further understanding the nature of collaboration (Ouchi 1980), collaborative structures (Ring & Van De Ven 1992), the management of network complexity (Ouchi 1980; Williamson 1985; Powell 1990; Ring & van de Ven 1992; Adler 1995; Heikkilä 2010), and the required coordination and governance considerations needed for the activities of collaborating companies (Heikkilä 2010).

Within the discipline of economics, networks and VCSs have been researched from viewpoints that include the cost aspects assumed to dictate the use of either markets or hierarchies by companies (Coase 1937; Williams 1975, 1985), the strategies of companies (Mintzberg 1978, 1990; Ouchi 1980; Ring & Van De Ven 1992; Kim & Mauborgne 2006; Doz & Kosonen 2013), supply chain management (Kemppainen & Vepsäläinen 2003; Kärkkäinen, Laukkanen, Sarpola & Kemppainen 2007; Cachon & Fisher 2000), and interfirm IS use (Kemppainen & Vepsäläinen 2003; Kärkkäinen, Laukkanen, Sarpola & Kemppainen 2007; Vepsäläinen 2009).

Within the disciplines of Information Systems Science (ISS) and Computer Science (CS) research on networks and networked collaboration often adopts and combines the viewpoints of other research disciplines in an attempt to make novel, scientific as well as pragmatic contributions to the existing body-of-knowledge. For example, research on (the management of) change in an intra- and inter-organizational context (Pettigrew 1987; 1990a; 1990b; Heikkilä et al. 2010; Hassett & Paavilainen-Mäntymäki 2013), the coordination and management of the interdependencies of networked operations (Clemons et al. 1993; Kumar & Van Dissel 1996; Möller & Rajala 2007; Heikkilä 2010), business models (Bouwman, Faber, Haaker, Kijl & De Reuver 2008; Bouwman & Fiel 2008; Bouwman, MacInnes, De Reuver 2009; Heikkilä 2010; Heikkilä, Tyrväinen & Heikkilä 2010), business mode transformation (Aspara, Lamberg, Laukia & Tikkanen 2011a, 2011b), and the overall success factors for VCS operability (Hoogeweegen, Wim, Teunissen, Vervest, Wagenaar 1999; Parolini 1999; Tapscott, Ticoll and Lowy 2000).

Disruptions, innovations, and innovations management are, in the existing research streams, approached separately and also as interrelated concepts. Some researchers frame disruptions as a theory to be able to better describe and model their characteristics and nature (Chesbrough 2003; Christensen & Raynor 2003, Christensen 2006; Markides 2006; Hossain 2012). By associating disruptions with various organizational forms and structures, different VCSs are often investigated as systems that are created to and able to incubate and produce (Valkokari

et al. 2009; Rajala et al. 2012), exploit and monetize (Christensen & Raynor 2003; Chesbrough 2007; Crockett, McGee & Payne 2013) and sustain or gain a new competitive advantage (Mintzberg 1978; Kim & Mauborgne 2006; Carayannis et al. 2014) from emerging disruptions, such as those represented by disruptive innovations (Christensen 1997 Markides 2006; Sandström 2010).

Within the ISS context the inquiry touches upon issues such as the role of IT in disruptive innovations (Downes & Nunes 2013), IT as a disruptive innovation (Lucas & Goh 2009; Lyytinen & Rose 2003), and the use of disruptive IT (Elie-Dit-Cosaque & Straub 2011). A further look at existing literature highlights the diversity of ‘network’ research.¹⁰ Depending on the authors’ viewpoint and focus, VCSs are approached as either being the unit of analysis in themselves, or as a mean to increase understanding on topics like “network organizations” (Järvenpää & Ives 1994; Achrol 1997), “value creation” (Amit & Zott 2001), “value nets” (Jarillo 1998; Parolini 1999; Bovet & Martha 2000; Möller, Rajala & Svahn 2005; Kähkönen & Virolainen 2011), “business webs” (Tapscott, Ticoll & Lowy 2000), “inter-organizational systems” (Kumar & Van Dissel 1996), or, simply, as “nets” (Möller & Rajala 2007). Some of the different research standpoints of the network research are recognizable through the use of keywords to classify the research. Some examples of these keywords include the use of terms such as; “network management” (Heikkilä 2010), “strategic networks” (Möller & Rajala 2007) and “business networks” (Tapscott et al. 2000), highlighting the role of networks as part of a larger economic context.

Together these few examples illustrate that networks, in existing research, should be approached as an independent phenomenon requiring specific approaches and mechanisms in order to be managed, coordinated, functional and sustained. Likewise, networks are often approached from a ‘tool perspective’ in which these structural, often collaborative, constructs are considered as means and mechanisms to achieve or optimize desired targets and outcomes.

In the field of economics, the importance and focus of the research is pragmatic. Existing research has extensively focused on understanding the forms and motivation of collaboration (Coase 1934; Williamson 1975, 1985; Ouchi 1980; Granovetter 1985; Porter 1987), and the drivers that enable the companies to engage in continued and repeated network transactions with the same organizations (for example Powell 1987 & 1990; Jarillo 1988; Ring & van de Ven 1992; Clemons et al. 1993).

¹⁰ Network research in this context signifies the inquiry into the various roles, uses and embodiments of Value Creation Systems as a constellation of independent (network) participants.

Transaction cost economics (TCE)¹¹, is a concept made familiar by Williams (1975 & 1985). In the context of network research it has served as a central concept for understanding strategic dependencies between companies, and the use of either markets or hierarchies by companies in their attempt to optimize the manner in which their set business objectives are realized. As such, one stream of research suggests transaction costs as the determining factor for the use of either markets or hierarchies by companies, and therefore transaction costs are the main factor determining organizational boundaries (Sandström 2010). The shortcoming of the TCE concept is, however, in its failure to acknowledge properly the potential goal incongruence of cooperating parties (Ouchi 1980), and the resulting need and existence of, so called, hybrid forms of coordination and governance mechanisms between the markets and hierarchies (Ring & Van De Ven 1992). As Ring & van de Ven (1992, p. 484) rightly point out:

“[TCE] suffers from not adequately exploring other available governance structures, repeated structures, the dynamic evolution of governance and transactions, and the key roles of trust and equity in any inter-organizational relationship.”

Later research has combined the viewpoints of traditional institutional economists, and organizational sociologist and organizational theorists with the concepts of strategic management (Porter 1987; Mintzberg 1978, 1990; Ring & van de Ven 1992; Kim & Mauborgne 2006; Doz & Kosonen 2013). Combined with the empirical evidence from the markets and industries, this research highlights the role of collaborative networks composed of individual organizations as social constructs (Granovetter 1985; Pettigrew 1987, 1990a, 1990b; Ciborra 2001; Hassett & Paavilainen-Mäntymäki 2013).

Viewing networks as social constructs emphasizes their dependence on the concept and coordination of change. Referring to these changes ‘as a disruption’ or ‘in a disruption’ is meaningless without a proper definition of its perceived or realized meaning both temporally and in an objective context. For the purposes of this doctoral dissertation ‘change’ is contextually considered from the economic perspective of the collaborating companies. Following the definition of Pettigrew (1990a, p. 268):

¹¹ According to Ring and van de Ven, (1992, p. 483-484) transaction cost economics assumes economic actors are opportunistic and driven towards use of the most efficient, for example, least costly, control and coordination mechanism when a business manager decides between the use of either the markets, one’s own organization, or use of a hybrid solution as a mean to achieve a needed business result that involves strategic dependencies between other economic actors.

“Change is multifaceted; involving political, cultural, incremental, environmental, and structural, as well as rational dimensions. Power, change, opportunism, accident are as influential in shaping outcomes as are design, negotiated agreements and master-plans.”

Pettigrew (1990a) speaks for the importance of temporal and contextual inquiry. He furthermore notes the field of organization studies has “remarkably few studies on and of change that actually allow the change process to reveal itself in any kind of substantially temporal or contextual manner.”¹² In this doctoral dissertation this research need is addressed by longitudinally studying the evolution of the role of a collaborative VCS, and the role of financial realities (economic business value) as a motivation and as a driver of networked collaboration.

IS implementation success has been widely researched (Lyytinen & Hirschheim 1987; Morrell & Ezingard 2002; Orlikowski 2000; Markus 2004; Heikkilä et al. 2003; 2004). IS implementation has traditionally been comprehended as a technical process concerned with installing an inter-organizational system (IOS) (Kling & Allen 1996). Nurminen (1986) demonstrated the role of IS as a means to develop and structure a social system. His research suggested that the emphasis in development activities should not be separately targeted to either concern work or systems, but rather that the two should to be considered holistically as two sides of the same coin (Forsman & Nurminen 1994).

Implementing changes that affect either one of these two inherently dependent elements – work or systems (that are designed to perform the work) – must be seen as having an impact on a social system and its operability as a whole. Accordingly, instead of being seen as a technical process, the implementation, in a wider organizational context, must be seen as a holistic change process in itself (Heikkilä et al. 2003, 2004). In this doctoral dissertation, the implementation (establishment) of collaborative networks is studied through the evaluation of the use of technological framing as a process for establishing congruence over collaborative business models in the two focal companies and their business networks.

VCSs are increasingly seen as a prerequisite for the sustainability and long-term success of organizations in global markets (Pralhad & Hamel 1990; Means & Schneider 2000; Chesbrough 2007; Doz & Kosonen 2013; Carayannis et al. 2014). It is also acknowledged that different types of VCSs, at various phases of

¹² Pettigrew (1990a, p. 269) in addressing the need and value of longitudinal contextual inquiry highlights the need for academics to acknowledge the “importance of temporal interconnectedness, locating change in past, present and, future time”.

their lifecycle, require different coordination and governance approaches as well as differing management techniques to function according to expectations (Kemppainen & Vepsäläinen 2003; Möller & Rajala 2007; Valkokari et al. 2009; Heikkilä 2010).

Business models that are distinct from – albeit related to – strategy (Sabatier et al. 2012) embody those necessary elements of strategy needed to serve the function of creating and capturing value (Chesbrough 2007). Simplifying a business model to the level where it is simply defined as “the design or architecture of the value creation, delivery, and capture mechanisms it employs” (Teece 2010, p. 172), is an easily comprehensible generalization that, however, does not acknowledge the full spread of the concept. Business models are executed in the social contexts of economic actors, thus making it necessary for the business model to acknowledge the organizational processes and intangible cognitive meaning structures in the context and environment the business model is executed in (Tikkanen, Lamberg, Parvinen & Kallunki 2005). While academic research is increasingly conducted on the matter, more knowledge is needed on the specifics of the interrelation of the strategy, business models, and innovation of companies (Chesbrough 2003, 2007, 2010; Bouwman et al. 2009; Hossain 2012), and on the design of flexible business models (Rajala et al. 2012) for the creation of and long-term organizational sustainability (Sabatier et al. 2010; Carayannis et al. 2014) of collaborative business networks amidst disruptions.

To remain financially solvent and sustainable, networks, similarly to individual companies, must be able to make a profit in the long run. This, in generic terms, converts to a requirement for companies to – independently or as part of a network – cost efficiently deliver customer offerings that satisfy consumer needs. As disruptions punctuate and alter the status quo or markets and competition, more research is needed to properly address the interplay between the strategy changes of the focal company and the evolution of the entire collaborative network and its business model

1.5 Aim of the study and the research questions

The area of research this doctoral dissertation aims to contribute towards can be referred to as the strategic management of inter-organizational networks. The positioning of the study is illustrated in Figure 2.

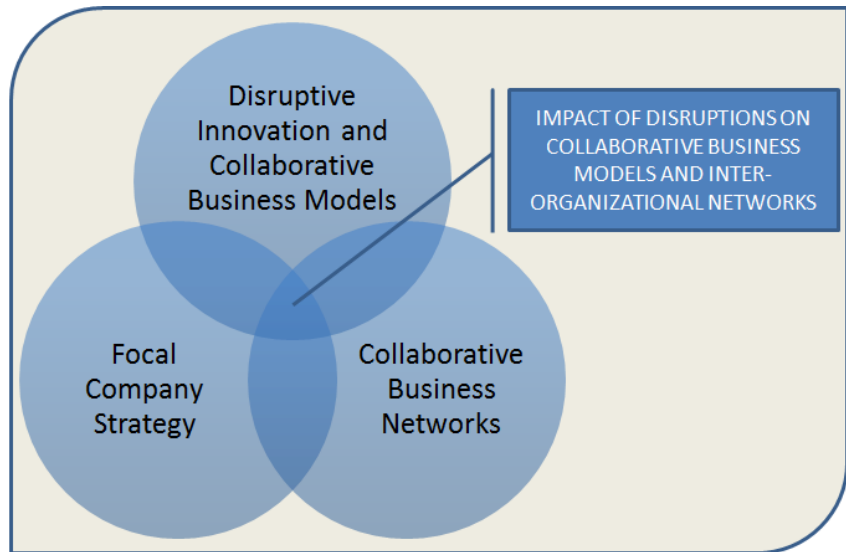


Figure 2 Positioning of the study

Figure 2 describes the positioning of the study along with the generalization of its intended contribution at the cross-section of the three specific research areas identified, each addressed in a separate chapter of this doctoral dissertation. Accordingly, the analysis of “Collaborative Business Networks” discusses the evolution and drivers of IS supported collaborative VCSs from the early context of simple dyadic supply chains through to complex reciprocal supply networks. The role of financial realities, the enabling role of IT, and the changing business objectives, needs and requirements in response to, or in the creation of, disruptions are illustrated as some of the drivers behind the companies’ continuing use of networked collaboration to achieve their operative as well as strategic targets. The analysis highlights the different types of collaborative objectives of the companies, requiring different types of network structures to aid their execution. The chosen network typology, and the role of individual economic actors within the collaboration are demonstrated to have significance for the coordination, management and performance of a collaborative network, and are thus identified as important elements to be acknowledged in the design and strategizing of a collaborative business model.

The analysis of “Disruptive Innovation and Collaborative Business Models” is performed to investigate the type, nature, and effect of disruptive innovation – as an embodiment of change – in driving and enabling changes in the collaborative business model of collaborating companies. The analysis demonstrates the capability of companies to successfully manage and exploit innovation in collab-

oration with other companies – when they have a strong dependence on the collaborative business model design, network typology, and on the long-term operational sustainability and relevance of the collaborative network.

The analysis concerning the “Focal Company Strategy” discusses the multiple meanings and comprehension of the concept and its significance for the sustainability and success of the companies individually, and as part of a networked collaboration. The interrelation of strategy with a business model is further highlighted through the evaluation of the dependence of specific strategy dimensions on specific business model elements. The result of the findings is that the dynamic nature of strategy is discovered to be often unplanned and susceptible to disruptions, which demonstrates a need for the careful planning, strategizing, implementation, and management by all the network partners. Furthermore, this needs to take place at the multiple levels of the collaborative network to ensure that the necessary strategic flexibility and operational sustainability can be achieved.

To address the research needs identified in the previous literature, three specific research questions are formulated:

- Research Question 1 (RQ1): What is the importance of shared strategy in the creation and long-term sustainability of a collaborative business network?
- Research Question 2 (RQ2): What are the types of disruptions that drive change, and how do those disruptions have an effect on the collaborative business networks within the investigated industries?
- Research Question 3 (RQ3): How can technology be used to facilitate and agree on the necessary frame specifications for collaborative business networks?

By addressing these three research questions this doctoral dissertation contributes towards the existing literature in three ways. First, this research provides a contextual longitudinal analysis on the network phenomena, presenting it holistically as a change process within the studied industries (Pettigrew 1990a, 1990b; Hassett & Paavilainen-Mäntymäki 2013). Second, this work provides a partial classification of some of those disruptions that have had an effect on the networked collaboration in the studied industries. Third, this research provides a comparison of the two approaches the focal companies of this doctoral dissertation are assumed to use in – and when establishing – their established business networks. Through this comparison, conclusions are then made as to how the different approaches of the focal companies may have affected the creation, operation and long-term sustainability of their networked collaboration.

Table 2 summarizes the discussion by depicting the relationship between the researched phenomenon, the derived research objectives – as based on the identified research needs in the previous literature, and the more specific research questions for the study. Furthermore, Table 2 clarifies the sources of inquiry and the expected outcomes.

Table 2 Aim and outcome of the doctoral dissertation

Researched phenomenon	Research objectives	Research Questions	Sources of inquiry	Outcomes
<p>The role of collaborative Value Creation Systems (VCS) in the evolution and the role of financial realities (economic business value) as a motivation and driver for networked collaboration.</p>	<p>What is the importance of shared strategy in the creation and long-term sustainability of a collaborative business network?</p>	<p>Literature review, and empirical case evidence, semi-structured theme interviews, case-reports.</p>	<p>Contextual longitudinal analysis on the network phenomena as a change process in researched industries.</p>	
<p>Why is it that some companies experiencing disruptions succeed in performing required the transformations to cope with or benefit from disruptions while others fail?</p>	<p>Interplay between the focal company's strategy and the evolution of the entire collaborative network and its business model.</p>	<p>Financial reports (f-20) and other publicly available material on the companies studied, empirical case evidence, semi-structured theme interviews, case-reports.</p>	<p>Classification of the disruptions that have an effect on networked collaboration in the researched industries.</p>	
<p>The process of technology framing in establishing congruence over a collaborative business model.</p>	<p>How can technology be used to facilitate and agree on the necessary frame specifications for collaborative business networks?</p>	<p>Literature review and empirical case evidence, semi-structured theme interviews, case-reports.</p>	<p>Comparison of the two approaches the investigated focal companies used to establish their business networks, and how these approaches may have affected the operations and long-term sustainability of their collaborative network.</p>	

1.6 Context of the study

The context of this doctoral dissertation are the collaborative business networks led by the two focal companies, which form the empirical units of analysis of the work. The first of these collaborative business networks is, according to its focal company's business domain, positioned within the pulp and paper industry. The second network operates in the mobile industry.

This thesis combines empirical evidence from three distinct cases. These are illustrated in more detail in Figure 3.

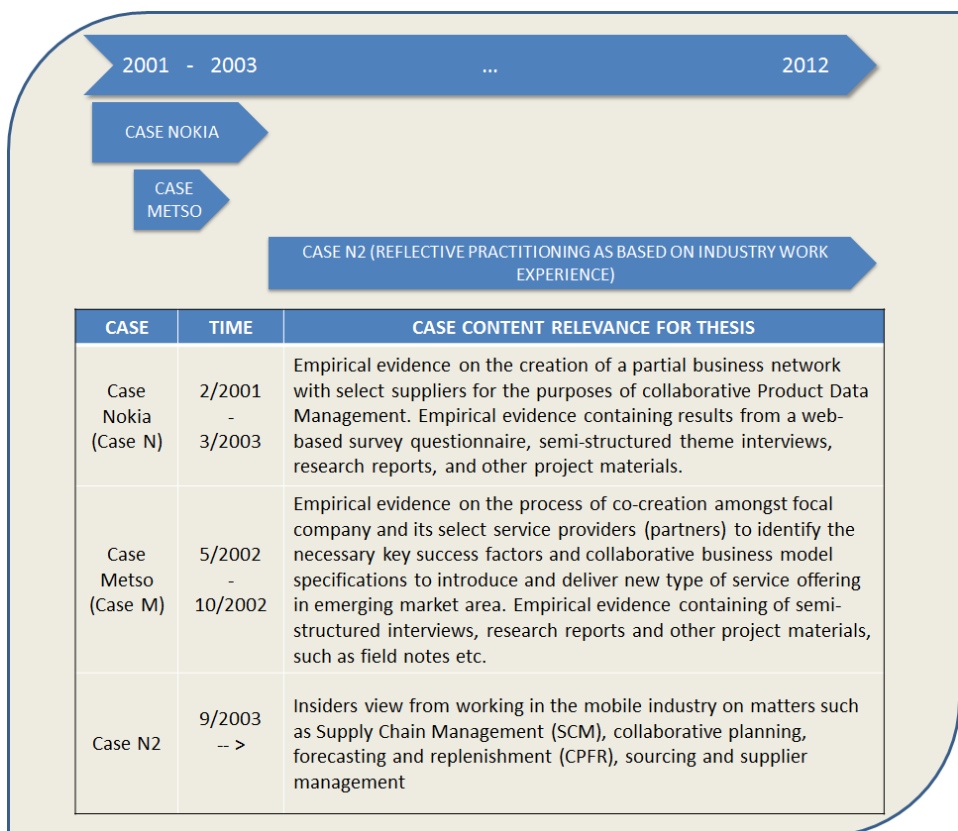


Figure 3 Time-scale and the content of the empirical evidence

Figure 3 chronologically highlights the sequence of the case research (referred to hereafter as cases) forming the basis and source of the empirical evidence utilized in this work. Case Nokia (hereafter Case N) and Case Metso (hereafter Case M) are industry cases that are based on distinct action research projects established around the specific objectives of the focal case companies. Case N2

differs from the two other cases (Case N and Case M) as it represents a longitudinal field study that is based on the author's own subjective experiences and views; gained from working in several positions within the mobile industry. All of the research projects, methodological standpoints as well as research design are discussed in detail in Chapter 5.

Case M is situated in the pulp and paper industry and investigates the collaboration of Metso Paper, as the focal company, with its selected supply network participants. The objective of the research project was to provide academic insight into the matters pertaining to the establishment of the networked collaboration amongst the partners to define, create, and deliver ICT supported solutions (equipment and/or associated services) in a new and emerging market area. Case M provides a distinct case for the comparison of the focal companies' approaches to establishing a collaborative business network with selected partners.

Case N is positioned in the mobile phone industry. The objectives of the research project mostly address some of those questions that Nokia Corporation had experienced when designing and strengthening its IT enabled collaborative Product Data Management (PDM) capabilities with its selected suppliers. For the purposes of this thesis, Case N provides another insight into the approaches of a focal company, thus enabling the comparison of its methods for establishing a business network.

Case N2 includes insights from the author's own experiences and reflections as a practitioner in the mobile industry. The author has, for more than a decade, been a part of, responsible for and has monitored the development of SCM-related capabilities and witnessed the change in the industry first-hand. This industry work experience has been utilized as a source of priority and insight (Heiskanen 1994; Heiskanen & Newman 1997; Heiskanen, Newman & Eklin 2008) with regard to matters pertaining to networked collaboration.

This thesis utilizes all of the above cases in a manner that allows the respective findings gained from them to complement previous literature on networked collaborations and strategic management.

1.7 Scope of the study

The main research streams this thesis builds upon are organization science, information systems science and economic sociology, see Figure 4.

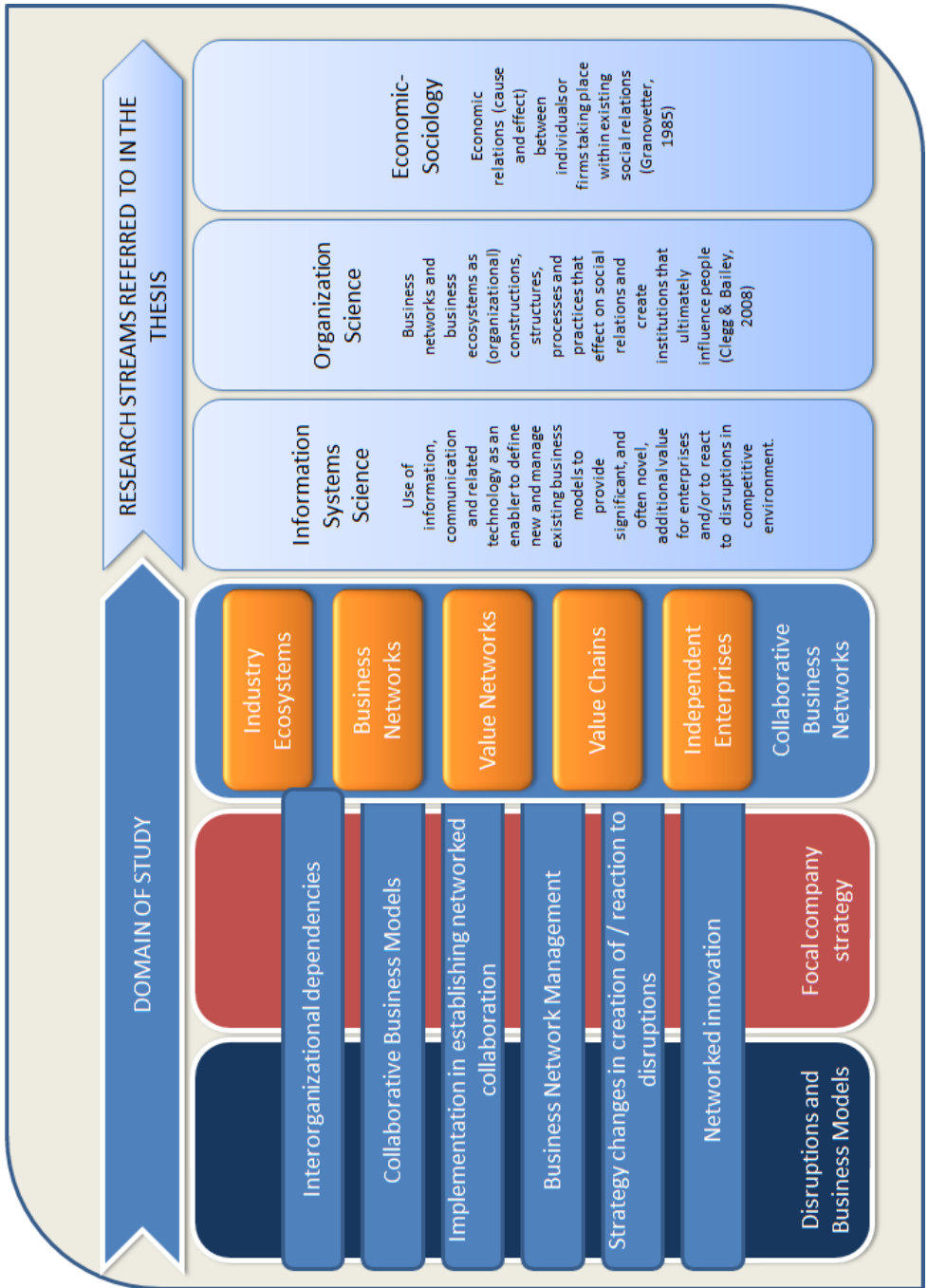


Figure 4 Scope of the doctoral dissertation

Figure 4 summarizes the interrelation between the theoretical domains and the viewpoint of the study as part of the investigated phenomenon. None of the specific research areas included in the scope of this doctoral dissertation – disruptions and collaborative business models, focal company strategy, and collaborative business networks – are capable of providing sufficient answers to the set research questions on their own. In other words, an inquiry combining the viewpoints of these interdependent research domains is needed to shed light on the phenomenon and, also, to identify new research avenues for further studies.

Disruptions by default are not to be seen as negative factors. Rather, according to Prahalad & Bettis (1995), disruptions may be viewed as intersections potentially capable of altering the so called ‘dominant logic’. Dominant logic refers to the established and shared conceptualizations held by the decision-makers of a business concerning the value context, value creation, and value capture, for example, at industry level (Phaal, O’Sullivan, Routley, Ford & Probert 2011). For the purposes of this thesis the concept of dominant logic and its parameters are applied in the context of inter-organizational networks, and, fundamentally, as elements described in the collaborative business models of the collaborating companies.

Disruptions within industries force companies to choose a course of action and either react to a disruption or not (see Sabatier et al. 2012 and their description of “technological discontinuities” as innovations driving changes in the value chains and existing dominant logic of industries). Disruptive innovations serve as examples of the type of radical disruptions (Kim & Mauborgne 2006; Bouwman et al. 2009; Sainio et al. 2012) that possess the ability to alter the operative environment of the collaborating companies, their business models and networks, or even shape or create new industries (Anderson & Tushman 1990; Sandström 2010).

These disruptive innovations may, within the existing industry ecosystems, be conceived internally by an individual actor or by the collaborative business network, but may also be introduced by an external party. For collaborative companies and networks, disruptive innovations introduce a type and level of dependence that require the networked innovation capabilities to be planned and prepared for within the collaborative business model. This planning and preparation is needed for the sustainability of the collaborative effort, for both the internal aspects (conceiving, commercializing and the related value-share of networked innovation), and the external aspects (the capability to react to the external disruptive events) of networked innovation.

The dependencies of companies are, in this thesis, considered from two perspectives. First, the financial perspective representing the motivation of individual companies to join, operate and remain in a collaborative effort. The second viewpoint considers the inter-organizational dependencies, which assumes the

companies' collaborative dependence on each other requires a business model that has been consented to and describes the boundaries for any collaborative efforts.

Networked innovation is, in this thesis, considered from the viewpoint of opportunities, challenges and capability requirements that the co-creation and capitalization of innovations imposes over networked operations and related business models. In the context of individual companies engaged in collaboration, as well as for business networks and industry ecosystems, flexibility has become a critical key success factor. This thesis argues that if a collaborative business network is to effectively engage in and utilize networked innovation, specific considerations in the collaborative business models of the companies involved – that may be inherently more limited within certain types of network structures – are required.

The term business model is, throughout this thesis, used to emphasize the economic value creation logic as the motive for networked collaboration. Furthermore, collaborative business models are the agreed boundary through which, both internally as well as externally, companies must find ways to optimize in order to successfully compete in the market place. These collaborative business models must acknowledge the role of a company as an individual enterprise, and its subsequent responsibility towards its owners and shareholders to best look after their interest. Therefore, being part of a collaborative business network must be justifiable in the long-term and in the best interests of all the involved companies, also as independent actors and business entities

Implementation is, in this work, considered as the means by which a collaborative business model is deployed in order to establish the required Value Creation System. As such, implementation in its broad sense, within the social structures of the collaborating companies, is considered to cover the implementation of both the technical IS supported architectural structure for the collaborative business networks, and those business processes required to ensure the operability of the network. Hence, implementation is considered to be the process for enforcing the blueprints that describe how companies individually or through collaboration align, transact and use their available resources (people, processes, knowledge and technology) to yield business value.

According to the viewpoint of organizational science, collaborative business networks are holistically seen as constructs building on structures, processes and practices that ultimately influence people (Clegg & Bailey 2008). Furthermore, along the lines of economic sociology, collaborative business models (embodied as business networks and other VCS structures) are seen to create and exploit dependencies. In doing so they constitute economic business relations amongst

business network partners in ways that, due to disruptions affecting the market place and individual companies, cannot always be fully anticipated nor accounted for (Granovetter 1985).

This thesis considers information, communication and related technology as an enabler for defining and managing business models that provide significant and novel additional value for enterprises. These concepts and tools, properly harnessed, allow companies to better react to and exploit disruptions in an overly competitive environment. ISS is a multi-disciplinary research discipline that derives from multiple research streams. As such, it acknowledges technological, social as well as economic dimensions to affect, for example, collaborative business relationships. ISS serves as the main discipline guiding the selection of theories, methods and research approaches used in this thesis.

In this thesis all the three aforementioned dimensions – technological, economic and social – are considered to be interdependent. As such, context plays a major role throughout the thesis and must be holistically considered in the coming analysis on the evolution of collaborative business networks. It is furthermore argued that these business networks' capability requirements are cumulative throughout the network development lifecycle. In other words, the actors in a business network must have the prerequisite capabilities for managing networked innovation in order to capitalize on the market opportunities being presented.

1.8 Structure of the thesis

The structure of the thesis loosely follows the steps of Jenkins's (1985) idea-to-publication research process. Figure 5 presents the structure of the thesis in more detail.

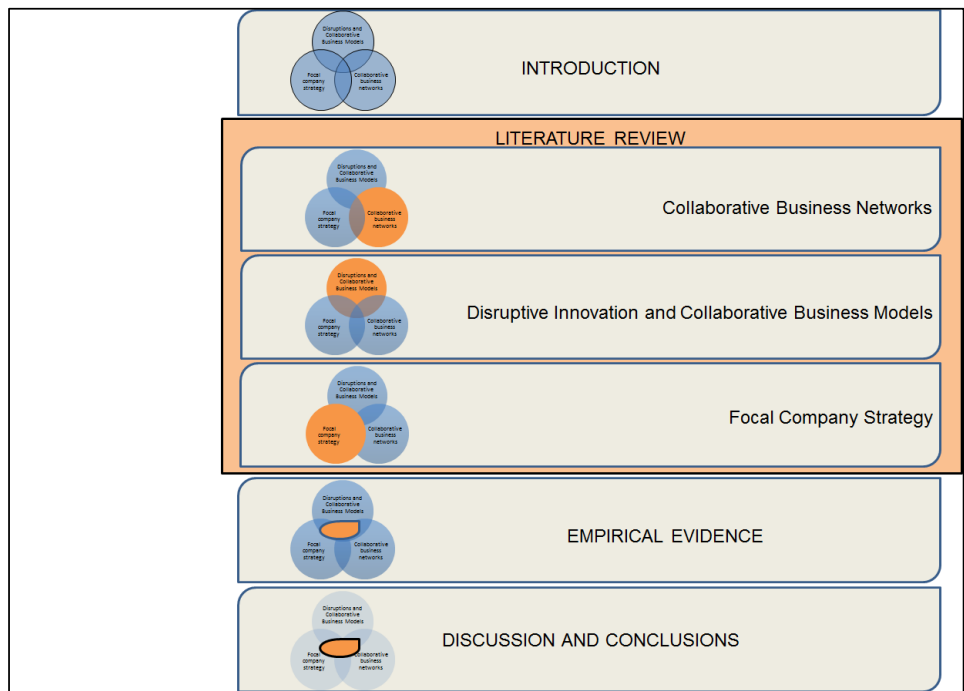


Figure 5 Structure of the thesis

This thesis begins with the introduction for the study. Chapter one provides the reader with a brief introduction of the research phenomena and its impact in an industrial context. The domains for the detailed literature review of the thesis are identified as are the specific objects of the research. The chapter continues by introducing the motivation and the need for research, followed by an illustration of the theoretical background and the research questions. It ends with an overview of the context, scope and structure of the doctoral dissertation.

Chapter two discusses the collaborative business networks. It begins with a literature review providing an overview of the phenomenon and by providing necessary definitions for some of the central concepts used throughout the thesis. The chapter continues with an overview on the evolution of and motivation for the network phenomenon as the willful collaboration of multiple independent economic actors. It continues with a discussion of the different types of network typologies and on the way their distinctive characteristics impact, for example, on the type and level of interdependencies amongst the network participants, and on the subsequent requirement for coordination. The chapter ends with a summary of some of those transformation trends that have influenced and driven change in the need and focus for inter-organizational ‘networking’.

Chapter three defines and discusses the concepts of disruptive innovation and collaborative business models as interdependent topics. It highlights different innovation management capabilities in order to show that certain expectations are attached to the collaborative business models. The networked innovation concepts in the chapter are introduced along with a consideration of the suitability of their approaches in conjunction with distinct network structures, which represent distinct business models. The chapter ends with a classification of distinct innovation systems and the types of business models, based on the level of the innovation system required: dependency, openness and interaction.

Chapter four discusses focal company strategy and provides a literature review of the relevant concepts. In this chapter, the interrelation and impact of strategy and strategy changes on the companies' collaborative business models and the different types of inter-organizational networks is discussed. The chapter aims to highlight the dependencies between the nature and impact of disruptions on the companies as well as the effect on their actualized strategy and business models. For this purpose, the generic dimensions of strategy are interpreted as distinct business model elements. The chapter then continues to discuss the linkage of strategy and operations in individual organizations and in collaborative business networks, presenting implementation as the process by which the needed collaborative business model alignment – at the relevant levels of and between the individual organizations and the network as a whole – can be achieved. The chapter ends with the introduction of the technology frame as both a concept (Orlikowski & Gash 1994), and as a usable process of 'framing' (Davidsson 2006; Kaplan 2008) in order to achieve and support 'strategizing' (Håkansson & Ford 2002; Gadde, Huemer, Håkansson 2003) between the collaborating companies.

Chapter five discusses the scientific standpoints of this doctoral dissertation, providing the reader with the theoretical foundation of the thesis in terms of both the philosophies of science and the research methodologies and the associated standpoints that govern its research approach. The specific cases that form the empirical backbone and evidence for this doctoral dissertation are discussed and described. The distinct research approaches and the results of the empirical evidence are, along with an explanation of the use of this empirical evidence, described in detail.

The empirical standpoints of this thesis are twofold. First, chapter six provides a longitudinal contextual study on two well-known focal companies, Metso Paper and Nokia (the mobile devices business), and their respective business networks in their industry setting. The aim of chapter six is to complement the literature reviews conducted earlier and to address the first two research questions of this doctoral dissertation. The chapter discusses the importance of shared strategy in the creation and long-term sustainability of various types of collaborative business networks, and illustrates the relationship and effect of disruptions on the

strategies of the investigated companies and the business models they have for value creation. Chapter six provides a contextual classification of some of those disruptions that are seen to drive change in the companies' strategies, and which, therefore, have influenced the requirements and outcomes of both the focal companies' themselves and their collaborative business models and business networks.

Chapter seven empirically approaches and addresses the third research question (RQ3) of this doctoral dissertation. It does that by comparing the two earlier case research companies, thus aiming to identify the facilitating role of technology in establishing the necessary congruence between the collaborating companies and their collaborative business networks. Chapter utilizes the concepts of technology frames (Orlikowski & Gash 1994) and framing (Davidsson 2006) as a means to analyze the impact of the approach of the focal companies when choosing to pursue their operative targets and to establish their business networks with their selected participants.

Chapter eight illustrates the different types of networks, for example, transaction networks and co-creation networks (Valkokari et al. 2009), to show the distinct requirements of the depth and magnitude of the necessary frame specifications pertaining to the collaborative business models, as well as the role and position of a company in its collaborative business network and how that affects the aspects of inter-organizational dependency, and, subsequently, the requirements for alignment.

Chapter eight concludes the thesis. In the chapter the results of the study and answers to each of the research questions are presented. It continues by considering the theoretical implications and practical implications of the work. It ends by discussing the reliability and validity of the doctoral dissertation, and identifies some topics for future research.

2 COLLABORATIVE BUSINESS NETWORKS

This chapter provides an overview of the definition, evolution and drivers of collaborative business networks. The chapter begins with a brief description being provided for both business networks and industry ecosystems; concepts which are later revisited and built upon in the doctoral dissertation. The chapter continues by considering the traditional drivers for companies wishing to engage in collaborative relationships with one another, and by illustrating the various types of network typologies that represent possible structures and roles in the collaborative efforts of companies. It has been established that network structure and the level of inbuilt hierarchy impact on a collaborative network's capability to transform and exploit networked innovation. Hence, the selection of the correct network typology and roles for the participating companies is demonstrated to be a crucial element for the long-term sustainability of a network. The chapter ends with the discussion on the evolutionary transformation trends that affect the way the networked operations are arranged, and by revisiting some of the change drivers that – in terms of the companies' strategy focus – constitute towards an organization's changing requirements concerning collaboration.

2.1 Business networks

The body-of-knowledge on collaborative business relationship theory began with Michael Porter introducing the value chain (VC) concept as a chain of activities performed by an actor to deliver something of value as an outcome (Porter 1980). Semantically the VC concept does not acknowledge the fact that real-life value adding activities can be performed simultaneously, at multiple times or by multiple parties throughout the value creation process. Hence, researchers and practitioners alike have built on this earlier popularization to expand and conceptualize complementary viewpoints, where the type, role, motives and nature of various actors combined with a specific need for the dyadic, and later multi-faceted, business relationship become focal for the derived conclusions (see Kumar & Van Dissel 1996; Parolini 1999; Tapscott et al. 2000).

The increased importance of business networks has resulted in substantial amounts of funding and research effort being put into the topic. While this has

enabled the accumulation of the associated theory base, contributing towards a growing body-of-knowledge for network research, it has also led to a conceptual ambiguity between several fields and the core phenomena itself (Möller & Rajala 2007).

As a result, the commonly used terminology in 21st century research considering various types of networks from multiple viewpoints is overwhelming, often adjectives are used to distinguish between the various research perspectives taken (e.g. value networks, smart business networks, collaborative business networks, etc.). Generally, networks are described as constructs where the value-added feature is reciprocal for one or many of the parties working together to reach the set objectives for the network and its participants (Parolini 1999; Bovet & Martha 2000; Tapscott et al. 2000).

So far it all seems conceptually clear, but in fact we are again at a crossroads where, due to environmental traits and industry specific variables, one viewpoint and definition is inadequate for holistically describing the network phenomena as a whole. The objectives of the individual network partners, and the objectives for the network, as well as the environment in which the network partners operate and influence has a significant impact on the operability and sustainability of a networked collaboration.

The characteristics of the industry domain influence the perspective for the evaluation of networks. Achrol (1997), in the field of marketing research, described the emerging network paradigm as a transformation moving the emphasis from dyadic two-party exchanges – as subject matter – into an extended inter-organizational network perspective that involves inter-organizational groups, described as network organizations. These network organizations, representing available network structures, were seen by Achrol (1997) as yielding managerial and economic benefits for the networking companies under circumstances where:

“the network is conceived as a mini-society of interdependent, reciprocal exchange relationships characterized by restraint of power, commitment, trust, solidarity, mutuality, flexibility, role integrity, and harmonization of conflict.” (ibid., p. 68)

Achrol (1997) identified four different archetypes of network organizations that highlight the variations, according to which, collaborating companies may choose to arrange their operations. These archetypes internal market network, vertical market network, intermarket network and opportunity network differ in terms of the power and dependence embedded into the network structure, and, as such, require different coordination and governance mechanisms (Achrol 1997; Heikkilä 2010). Therefore, depending on the requirements of the focal company and its industry, concerning, for example, the required level of control and value

integration (Tapscott et al. 2000), companies may arrange their operations accordingly in order to best meet the set objectives of the networked collaboration.

What becomes evident from the above is that creation, joining as well as operating within a network requires management, coordination and conscious effort from all of the network participants. Therefore, the available resources of the companies and the availability of suitable mechanisms to arrange for the operability of the network, such as business processes and information systems, both mature over time and affect the willingness of companies to engage in network operations.

In the mechanical engineering industry, electronics, and the metals industry, networks have most often been perceived as a means for effective subcontracting and optimization. For this reason, supply chains provide an interesting analogy for the holistic evaluation of trends relevant for the evolution of business networks and industrial ecosystems.

Anderson, Håkansson & Johanson state that “[To better understand dyadic business relationships in business-to-business (B2B) settings] greater attention must be directed to the business network context within which, dyadic business relationships take place” (1994, p. 13). Similarly to B2B relationships networked coordination needs and mechanisms are dependent on the context and time in which they take place.

Especially in the field of economics, commercially justified need dictates the form and function that a business network takes – as embodied by the network’s business model. Need may be represented by clearly stated customer requirements, the requirements of the network as a whole, or as a quickly realizing business opportunity. Nevertheless need acts as the ‘invisible hand’ guiding the free markets to produce the right amount of correct goods (Smith 1776).

In the context of business networks, need also plays a role in the partner selection and poses certain competence requirements for companies to form, join or function in as part of a network and in a needed timeframe. In order to better model, analyze and understand this phenomenon, a vast amount of research has been conducted and solutions proposed on various network architectures, network models and modeling techniques. This research has resulted in a broader general understanding of the various network types. It has also produced several business opportunities and usable tools for determining how different types of value-creation systems should and could optimally be set up and coordinated under various needs and situations (Kumar & Van Dissel 1996; Tapscott et al. 2000; Heikkilä 2010).

In her thesis Heikkilä builds on the earlier concept of smart business networks by Vervest, Preiss, van Heck and Pau (2005) and defines them (2010, p. 25) as:

“A group of participating businesses that agree to cooperate in some novel, knowledge enhancing ways and to depend on each other to some extent, in an aim to reach business objectives, perceived by each participant as fair play, and sustainable over time as a network.”

From the above it becomes evident that mutual understanding on an agreement governing the collaboration and co-operation in pursuit of set business objectives is inherently embedded in the definition of a business network. By referring to sustainability over time, the concept assumes that the network participants are willing to share information and have the capability to learn and innovate.

For the purposes of this thesis I will use this definition of a smart business network by Heikkilä (2010) and only make a small addition to it to emphasize the importance of defined and measurable value creation logic for the existence of intentionally created business collaboration in which the presence of individual and independent companies is justified. In this thesis, business networks are defined as:

“A group of participating businesses that as independent companies expect to benefit from the collaboration with other companies and, thus, agree to cooperate in some novel, knowledge enhancing ways and to depend on each other to some extent, to reach set business objectives and exploit value networks realized or realizing innovation potential, perceived by each participant as fair play, and sustainable over time as a network.”

In line with the above, Möller and Rajala (2007), in their effort to contribute towards what they call *emerging network theory*, created a three stage business net classification framework for generic business network types (referred to as ‘nets’), where the underlying value creation logic of the collaboration is the key which the effective management of a collaboration is dependent on.

Distinct stages used in their business net classification framework to represent different value creation logics are ‘current business nets’, business renewal nets’ or ‘emerging new business nets’. In the framework the level of determination is used as a variable. The range of the framework runs from a stable, well-defined value system, represented by ‘current business nets’ to emerging value systems, called ‘emerging business nets’. This range is then used as the key viewpoint for the selection of the most effective management methods for the networked collaboration in question. The assumption built into the framework is that the more

definition and certainty a collaboration contains, the less demanding is its management.

The framework tacitly implies time is an important factor for the operation and operability of a business network. This finding is supported by both common sense as well as also earlier research on networked business operations (e.g. Vahtera 2001; Heikkilä et al. 2003, 2004; Kumar & Van Dissel 1996).

The willingness of network participants to invest in collaboration is naturally dependent on the expected benefits from and length of collaboration a company considers engaging in. Earlier literature has used the stability of a network as a descriptive factor, and introduced terms such as ‘static networks’ (stable) and ‘dynamic networks’ (temporal) to draw conclusions on the factors influencing collaborations as a whole and network participants as individuals (Vahtera 2002; Heikkilä et al. 2003, 2004; Bouwman et al. 2009).

Intra- and inter-organizational collaborative relationships amongst partners can be established for multiple reasons, for example to support buyer-supplier relationships, enhance innovation, to aid technological or product advancement, etc. Consequently, the significance of this, as well as similar, business net classification frameworks as proposed by Möller and Rajala (2007) is that they conceptualize networks according to the select main characteristics derived from economic realities, and understand the temporal existence of collaboration as being based on value-creation logic, which forms the motivation for the network to be created and/or exist. As such, the applicability of the findings is straightforward when extrapolating it in a real-life context.

Inter-organizational relationships have traditionally been researched more from the viewpoint of *what* is needed to establish and engage in network operations and what the related architectural requirements are. However, for the research and findings to be applicable in the real-life business context, it is important to understand *how* to effectively manage and coordinate a network’s collaborative activities. In academic research this type of a separation of a network into either a static or temporary state makes sense, it should be kept in mind that in real-life business situations network collaborations are often hybrid, meaning that they take on characteristics from multiple network types, based on the business opportunity and need for the network.

2.2 Industry ecosystems

As we have deduced, business networks must be constructed around a business need and, in doing so, they have to take the underlying value-creation system,

level of determination and time of (and for) the collaboration into account. All this sounds simple enough, but what is still missing from the discussion here is the consideration of the prevailing industry specific characteristics, which have an immense impact on the collaborating business networks.

Business ecosystem is an especially topical term at this moment in the high-tech industries. The term itself was introduced by James F. Moore (Moore 1993) as:

“An economic community supported by a foundation of interacting organizations and individuals—the organisms of the business world. The economic community produces goods and services of value to customers, who are themselves members of the ecosystem. The member organisms also include suppliers, lead producers, competitors, and other stakeholders. Over time, they co evolve their capabilities and roles, and tend to align themselves with the directions set by one or more central companies. Those companies holding leadership roles may change over time, but the function of ecosystem leader is valued by the community because it enables members to move toward shared visions to align their investments, and to find mutually supportive roles.”

As we can see, the definition of a business ecosystem bears significant resemblance to the definition of smart business networks. Where the difference is evident, however, is that business ecosystems also acknowledge the significant role of customers and competitors as part of the value creation system and logic. Within one ecosystem there may be several different business networks that either – knowingly or unknowingly – impact on the success, or failure, of the whole ecosystem.

A topical example of competing, alternative, ecosystems is those of the mobile phone industry where two major smart-phone platforms (along with their associated ecosystems – composed of device manufacturers, suppliers, and content providers for Apple iOS and Android developers) dominate the market, while the emerging, Microsoft led, Windows Phone platform attempts to gain a foothold and market share. Common to these ecosystems is that they must appear more appealing to customers than their competitors’ ecosystem and their complementing products, services and solutions if they are to achieve commercial success.

Companies may belong to and participate in one or more business ecosystems at the same time. For example, one supplier may serve many companies competing in different business ecosystems. Furthermore, a contract electronics manufacturer may build devices for several companies and across multiple business ecosystems. Does this simultaneous collaborative competition imply that these

business ecosystems would be somewhat detrimental or inferior to tighter collaboration in business networks? The answer, simply put, is no.

Business ecosystems, as highlighted by Moore (1993), are embodiments of communities thriving to realize individual business objectives by advancing some common goals necessary for that purpose, their actions making the whole ecosystem more attractive for new business, enterprises, developers and, of course, customers. For many companies, a business ecosystem is the tool providing access to the market place in which a smaller, even niche, offering may be brought to market and sold in volumes to a targeted customer base.

Brandenburger and Nalebuff (2011, p. 13) describe a concept they call “complements mindset” to explain why some companies, and even nations, become successful while others fail. To illustrate this mindset, they introduce an amusing metaphor that nicely fits into the context of business ecosystems as it highlights their use and usability for individual, even competing, companies.

“Thinking complements [in example automobile insurances and cars or computer hardware and software] is a different way of thinking about business. It’s about finding ways to make the pie [sought out value for companies, such as profits etc.] bigger rather than fighting with competitors over a fixed pie.” (Brandenburger & Nalebuff 2011, p. 14)

For the purposes of this thesis I use a combination of the above mentioned definitions for smart business networks and business ecosystems when referring to business networks operating and being affected by the characteristics and boundaries of a specific industry, hereafter called industry ecosystems:

“Industry ecosystems are economic communities operating within, and according to, the boundaries of a specific industry. An industry ecosystem is supported by a foundation of interacting organizations, individuals, philosophies, beliefs or cause(s). It expands around a focal company or innovation and shares a common vision that supports participants in aligning their strategies and investments, and guides the participants to assume, achieve and take on the roles necessary for the success of individual participants as well as the industry ecosystem as a whole.”

2.3 Why networks?

The existing literature discusses a multitude of disruptions in an attempt to explain the forces driving companies to seek out and engage in continuing cooperative relationships and collaborative strategies with other companies. From the viewpoint of strategic management, Ring & Van De Ven (1992, p. 483) generalize that these forces stem from disruptions such as rapid changes in technology, the competitive environment of companies, and firm strategies. Kumar & Van Dissel (1996, p. 282), from the viewpoint of information systems science, expand on this and come up with the following categorization of disruptions driving the phenomenon: environmental forces, such as globalization and environmental turbulence; the support role of IT in reducing transaction costs and transaction risks; the enabling role of IT in making collaboration feasible; and the motives of the cooperating parties for dealing with issues, such as resource pooling, risk sharing, utilizing relative advantages, reducing supply-chain uncertainty, and increasing resource utilization.

Companies strive to optimize the performance and value they generate for their owners and shareholders. As such, collaborative business networks under existing technology paradigms and established markets – especially those concentrating the execution of predefined and relatively unchanging routine tasks and activities, for example, those on the supply management side – provide companies with possibilities to increase their efficiencies, and organize their global presence and the global reach for their offering in the desired market areas, while at the same time distributing operative risks throughout the network. At the same time, networks provide companies with opportunities to, if so willed, share necessary assets to balance the resources of companies associated with, for example, open innovation capabilities and R&D (Chesbrough 2003; Hossain 2012).

Abernathy (1978) argues that an organization's capability to compete in the long-term relies on both its efficiency and innovativeness, but, at the same time, organizations focus on productivity, which hinders their innovation capability. Accordingly, this 'productivity dilemma' (ibid.) Benner & Tushman (2003) identifies a contradiction that indicates companies, in the midst of evolving industrial environments and disruptions, simultaneously require the capability to both 'exploit' their current capabilities and business models while 'exploring' the new opportunities to sustain competitive advantage (c.f. Abernathy 1978, Hayes & Abernathy 1980).

Structure, processes, hierarchies as well as cognitive structures, such as the values and cultures of established firms and networks, are often optimized to meet the requirements of their existing business models and technological paradigms (Sandström 2010). Whereas, although the operations of established firms may be optimized to exploit opportunities within the prevailing status-quo, they

may be less equipped to simultaneously innovate and explore, or lack the skills and competencies to transform according to the requirements of the future needs and capabilities for sustainability.

Various types of network operations are present in virtually all the industries and the collaborations that companies engage in. These networks, as embodiments of VCS, are often complex in nature. This complexity results from the networks typically having intra- and/or inter-organizational touch points over multiple domains, such as the personnel, process capability and IT system solutions of one or many autonomous companies.

A typical network is built around the needs of a focal company and is composed of those select participants needed to execute the desired value creation logic of the collaboration. Simply put, a network typically consists of a focal company, service providers, suppliers, and the suppliers' suppliers (first tier suppliers supplying the focal company directly and the second to n^{th} tier suppliers supplying the previous tier), and customers.

The value created by VCS constructs depends on the need of the companies at the time of the collaboration, and may change over time. The value may be expected and realized in the form of new or complementary knowledge, products, and revenue. Entering into a networked collaboration, however, also involves both costs and risks, and therefore requires management and coordination to be properly addressed (Heikkilä et al. 2003, 2004; Heikkilä 2010).

ICT solutions, plus standard, and best-practice processes in general terms may facilitate a higher degree of outsourcing and contribute as enabler for organizations to focus on their core activities (Clemons et al. 1993). At the same time those processes and solutions emphasize risks associated with, for example, intellectual property and the opportunistic misuse of trust amongst companies (Kumar & Van Dissel 1996). Whereas ICT serves as a helpful tool to enable the network phenomenon, its use has to be planned, managed, and socially fitted into its intended social environment (Heikkilä et al. 2003, 2004). As the roles and position of a company within a network, and as part of the collaboration as a social construct, may significantly differ, network participants may perceive the aspects of expected value, costs and risks associated with collaborating with other companies differently. The management and coordination of intercompany relationships is therefore complex (Heikkilä 2010) and has become a key capability requirement for companies seeking to benefit from their inter-organizational relationships with other companies (Gadde et al. 2003).

Companies' business models as well as production paradigms change and evolve over time – as dictated by need, or in response to disruptions (Jovane, Koren & Boer 2003; Bouwman, MacInn & deReuver 2009). Disruptions driving

changes to business models may result in significant pressure on individual companies to gain access to new or complementing competencies. For some companies these changes may render their prior core competencies altogether obsolete and force them to either resort to its complementary assets to sustain business (Tece 1986), find ways to renew its existing value offering and associated competencies, or exit the market place. For a network, disruptions may – in their creation or response – constitute a challenge that impacts on the structure and composition of the network, its participants, and participant roles.

The source and nature of disruptions may be many; their perceived severity impacting on the speed at which the changes are implemented, i.e., the level of an individual company or the network. As such, the speed of change within industries as well as the capability requirements associated with specific production paradigms also depend on their environmental context, such as customer requirements and product preferences, and on the availability of environmental enablers, for example, the infrastructure needed to create and deliver the offering efficiently according to customer needs.

Jovane, Koren & Boer (2003) investigated the development of production paradigms¹³ and characterize this evolution over time as depicted in Table 3. Jovane et al. (2003) consider the context – technology, society, and markets – driving production paradigm evolution. Specifically:

“...the most relevant tendency that occurred during the years moved from the request for high volumes of undistinguished products to be sold at widely affordable prices, to the current request for customized, continuously changing products. In parallel, in the society the request for environmentally friendly products became more and more important, also pushing for continuous modification of environmental laws and, hence, of products. Four main requirements, hence, emerged, during the years, driven by market competition and society: [first] need for lower prices; [second] need for customization; [third] need for innovation; [and

¹³Jovane et al. define the four production paradigms as follows: “Craft production means to make exactly the product that the customer asks for, usually one product at a time...Mass production means to produce extremely high quantities of identical products, and selling them to customers that will always be there to buy them...Flexible Production was introduced in the 1970s in order to respond to a change in the market, that started to be saturated by mass produced goods, and a request for more diversified products. The lot size decreased as the products were introduced more and more frequently on the market trying to adapt themselves to the taste of the customer... Mass Customization and Personalization means to produce a variety of almost-customized products at mass-production prices. It is a society-driven paradigm, as customers are asking for a larger variety in consumer products.” (2003, p.5)

fourth] need for environment consciousness. Such requirements impacted production inducing three main common necessities, which were faced by different production paradigms: productivity, customization and agility.” (Jovane et al., 2003, p.4)

Table 3 Evolution of production paradigms in Western economies (taken from Jovane, Koren & Boer 2003)

Paradigm	Craft Production	Mass Production	Flexible Production	Mass Customization and Personalization	Sustainable Production
Paradigm started	~1850	1913	~1980	2000	2020?
Society Needs	Customized products	Low cost products	Variety of Products	Customized Products	Clean Products
Market	Very small volume per product	Demand > Supply Steady demand	Supply > Demand Smaller volume per product	Globalization Fluctuating demand	Environment
Business Model	Pull sell-design-make-assemble	Push design-make-assemble-sell	Push-Pull design-make-sell-assemble	Pull design-sell-make-assemble	Pull Design for environment-sell-make-assemble

Production paradigms reflect the changes in the core competence requirements of a company concerning the effectiveness of their manufacturing and offering delivery. Societal needs and market (demand) characteristics, in turn, represent the macro-level disruptions that shape core competence requirements and infrastructure requirements which a company must have access to if they are to cost efficiently compete while meeting customer demand. Whereas mass production capability calls for efficient supply and capacity management and typically enables the use of inventories to balance demand and supply, different requirements are posed by mass customization and personalization. Depending on the product, the expectations of customers and the decoupling point at which customization and/or personalization takes place, then the requirements of agility, flexibility and availability management, for example, for the storing of inventory, may increase throughout the network. Consequently, the risks associated with the availability of both the right supply as well as the right suppliers, plus the higher cost structure throughout the whole network on all tiers of the supply chain, are additionally increased.

Production paradigms relate to networked business model capabilities as they pose different types of requirements for the companies involved. For example, the volume of production, societal needs, the underlying market demand and

market maturity are variables that are often understood to differ between production paradigms. Jovane et al. (2003) developed the illustration (Figure 6) below to visualize the production paradigm shift of Western economies over time.

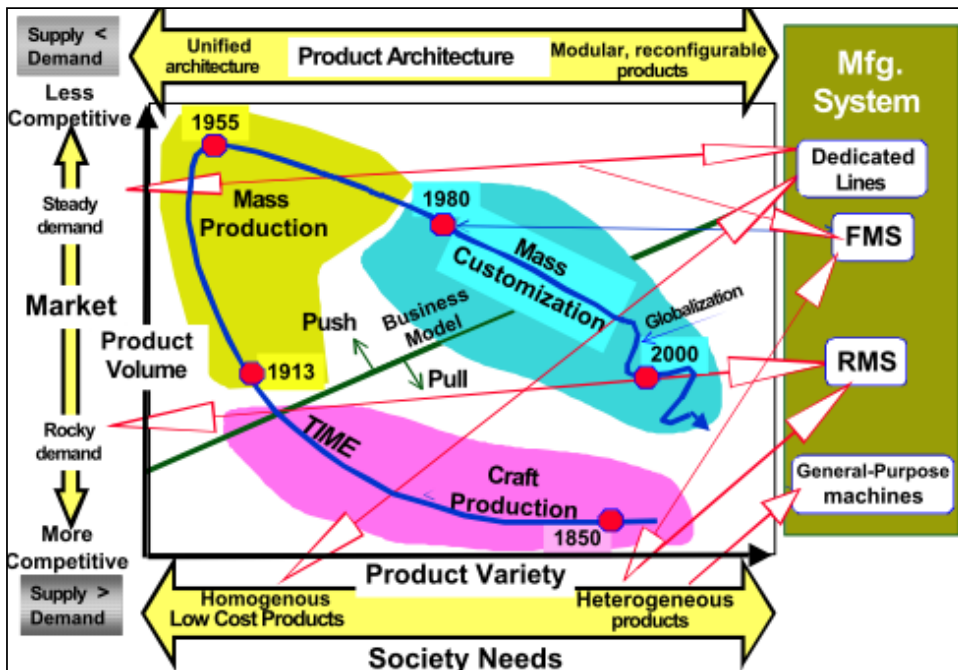


Figure 6 Evolution of production paradigms related to market and society (Jovane et al. 2003)

The model depicted in Figure 6 concentrates on production paradigms for tangible goods but the underlying logic also resonates with the visible evolution of the intangible service business paradigm. It is important to notice that Figure 6 simplifies the sources of disruptions as drivers for a paradigm shift either originating from the needs of society or market conditions at a given time. This is a good categorization for the evolution of different yet generic production paradigms. However, the research of intercompany business models requires that a wider perspective be taken on disruptions, including the social aspects of the willingness of companies to collaborate.

In this illustration, the relationship between different production paradigms is investigated in terms of four input drivers: markets, societal needs, process enabling manufacturing systems, and the business model. Globalization is assumed to not only represent the geographical dimension but is also a requirement for companies when they produce and supply a variety of innovative as well as localized products in multiple markets. Furthermore, it refers to a company's ability to cope with demand uncertainty and increased customer-centricity as represented,

for example, by the use of flexible / multiple business models suited to market area needs (Jovane et al. p.6).

Jovane et al. (2003) identified a growing trend in the demand for heterogeneous products and the fluctuating pull-type of customer demand, which drives the capabilities required for and associated with mass customization. Furthermore, they identify this demand for the capability for mass customization as affecting product architecture requirements for the most efficient use of manufacturing capacity and supply availability. For example, the requirements for product modularity and re-configurability have become emphasized by companies operating globally with a predefined product portfolio, manufacturing capacity and supply availability. Product modularity in these types of circumstances allows companies to deliver their products timely, acknowledging market area specifics and characteristics that fulfil legal requirements or consumer preferences, while simultaneously optimizing their supply chain structure and associated costs.

In volatile markets it has become challenging for any single company to possess the required competencies in-house and to do so cost efficiently. As a result of this we continue to see companies focus on their core competences and acquire the other skills and expertise required for the fulfillment of customer demands from the B2B market (Pralahad & Hamel 1990). The boundaries between companies continue to blur as the integrated operations span across organizational boundaries over the network of companies (Heikkilä et al. 2003).

In the network context the rapid speed of change, or rather the evolution of industries and their required business models, calls for the ability to continuously renew collaborative activities for the fulfillment of customer requirements. Otherwise the VCS created for a certain purpose will fast become inefficient or even obsolete in the eyes of their customers. For the focal companies of a network these rapid changes create new requirements to be mastered, possibly multiple networked business models along with their associated capabilities, processes, etc.

For industries such as the pulp & paper industry and the mining industry, the raw materials used in their customers' processes may pose such requirements for the focal companies' networks. These requirements are realized in form of additional competence and capability requirements, but may also require an existing solution offering to be tailored according to the needs of the customers or the market area. In the mobile industry, this can be seen as the segregation of the markets according to value-based products (smart phones) and volume-based products (mobile phones), both having distinctive characteristics and the potential for supply chain optimization.

Regardless of the nature of the disruption, companies, and especially network focal companies, are individually – and in response to disruptions – forced to make the strategic choices necessary for their continued and sustained profitability. An organization’s strategy process is most often driven by the goal to maximize shareholder value. This means that companies, by nature, are constantly seeking new methods while making choices to increase sales, market share, cut costs and, overall, maximize their profits. Therefore, as becomes evident, disruptions need to be seen as drivers that not only enable, but also force companies to network and engage in collaboration, or in some cases, co-opetition (Nalebuff & Brandenburger 2006). Consequently, networked collaboration may in many instances be evaluated as a necessity for an individual company to succeed and reach its intended business goals.

2.4 Types of networks

Networks can take on and reflect different structures and interdependencies depending on the companies’ strategies and aspirations (Thompson 1967; Powell 1987, 1990; Ring & Van De Ven 1992). Tapscott, Ticoll & Lowy (2000, p. 28) present examples of such distinctive network typologies (a.k.a. business webs), where the form of network is classified according to its level of control (in terms of self-organizing vs. hierarchical) and value integration (in terms of low vs. high). Some b-webs have hierarchical economic control in which the b-web has a leader, who controls the content of the value proposition, the pricing and the flow of transactions. The other extreme, where markets and market dynamics define the content of the value proposition and price, is described as a self-organizing b-web (Tapscott et al. 2000, p. 29).

When contributions from multiple sources are integrated for the production of a specific product the value-integration is described as high. At the other end of the spectrum is a b-web with its focus on a selection of products, but low value integration, meaning that contributions from multiple sources are used for a variety of products instead of one integrated solution (ibid., p. 29). Figure 7 illustrates the taxonomy of five distinctive b-web typologies.

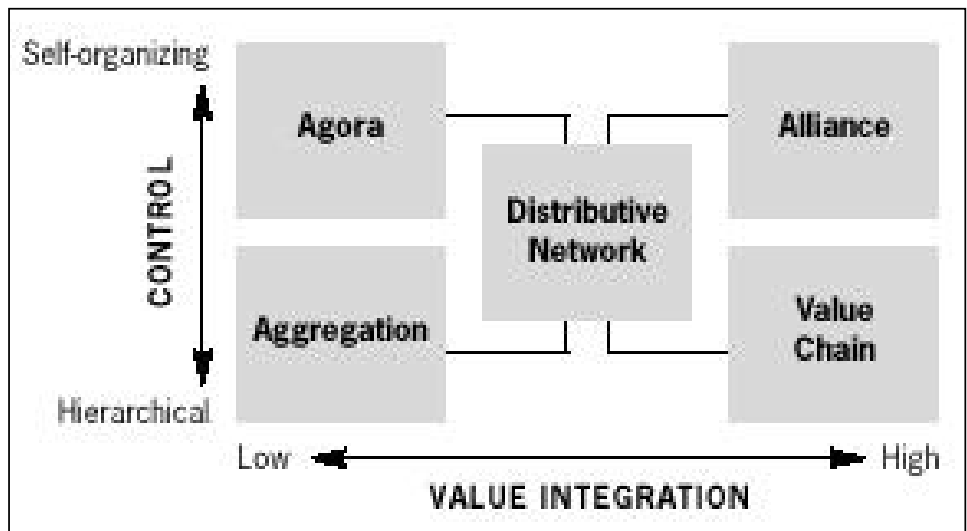


Figure 7 Taxonomy of five distinctive network typologies (Tapscott et al. 2000, p. 28)

Figure 7 highlights how operating in a network of individual companies introduces dependencies and has an impact on the power position of and between companies (Thompson 1967). Consequently, the distinct typologies originate from the rational selection of ‘the best’ business model for the situation. Dependencies impose a requirement of trust in and between the collaborating companies. The level and nature of interdependence between the companies affects both the potential for conflict and the need for coordination (Kumar & Van Dissel 1996). The more complex these interdependencies are, the more coordination is required to govern the collaborative actions. Hence, as stated by Kumar and Van Dissel (1996, p. 283), “an increased level of interdependence is likely to increase the potential for conflict by increasing the need for coordination.”

Thompson (1967) categorizes dependencies according to three distinct types: Pooled dependency, shared dependency and reciprocal dependency. Pooled dependency is the simplest form of dependency, where independent units share or produce the same resource while otherwise remaining independent of one another. As such, all collaborative parties are dependent on the availability and quality of the shared resource, but also on the actions of the other collaborative parties affecting the same shared resource.

Sequential dependency (Thompson 1967) describes a type of dependency where the output of one unit is the input for another unit. The typical allegory for

this dependency type is, for example, the supply chain where a semi-finished good is passed from one supplier to another in order to make a finished good.

Reciprocal dependency describes a situation where independent units are simultaneously contributing towards a shared work unit, and where the dependency is shared by multiple collaborating partners simultaneously.

Types and mode of dependencies amongst network partners may change over time, and be different from one actor to another. Reflected in the network typologies presented in Figure 7, self-organizing networks typically offer less possibility for the implementation of premeditated structure and, hence, require network participants to share and manage more trust between one another (Heikkilä et al. 2003).

A dependency for companies' represents risks that require coordination mechanisms be mitigated. Importantly, the classifications are not mutually exclusive; the actual networked collaborations may have characteristics of several typologies. In the words of Tapscott et al. (2000, p. 31) "Successful businesses construct a competitive b-web that best suits their needs, rather than blindly accept one model and ignore the others." It should, however, be noted that maintaining multiple business networks and their associated capability requirements consumes company resources and may involve, for example, infrastructure costs.

2.5 Coordination of inter-organizational networks

Different networks require different types of coordination mechanisms (Thompson 1967; Mintzberg 1979, 1983; Heikkilä 2010) and the complexity of governing these collaborative business networks represents a challenge for the participating companies. The operative risks of networking may be reduced through means such as the forming of customized partnerships with a reduced set of select companies (Clemons et al. 1993), and by the selection of the network typology to inherently include high levels of structure and focal company control (Tapscott et al. 2000). These collaborations, based on hierarchical control, are fundamentally different from the self-organizing networks as they rely more on market coordination as supported by standards, shared information systems, best practice processes, and competitive services (Kemppainen & Vepsäläinen 2003). However, in these latter types of self-organizing collaborations, the need for explicit, agreed and transparent coordination remains because the operational environments of companies and industries cannot be expected to remain stable. Market coordination alone cannot be relied on to provide the means for collaborative companies to mitigate collaborative risks, nor to exploit the arising opportunities during a disruption.

The selection of the network typology to support the collaborative efforts of companies should be matched against and reflect the requirements of the collaboration. Valkokari et al. (2009) introduce two types of network models that fundamentally differ in their associated capability requirements: transaction networks, and co-creation networks. According to Valkokari et al. (2009, p. 9) whereas transaction networks are targeted “towards exploitation of existing knowledge” co-creation networks aim for the “exploration of new knowledge and approaches or solution to problem”.

The difference between the two thus becomes visible through their level of tolerance for ambiguity; whereas a transaction network, such as the manufacturing of goods within a supply network, is built around a certain pre-defined task (as represented by the goods produced), the co-creation network must allow for greater flexibility concerning its outcomes. From a knowledge management viewpoint, these two models differ in terms of the formally managed and defined explicit knowledge associated with transaction networks, and the management of more unknown and less defined tacit knowledge within the co-creation networks (ibid.).

In her work Heikkilä (2010) considers different coordination mechanisms in terms of their requirement for communication (richness of information transfer¹⁴) and structure,¹⁵ and concludes that the more dependent the actors, the more structured and interactive are the coordination methods that are required (c.f. Thompson 1967 & Kumar & Van Dissel 1996).

2.6 Transformation trends driving changes in network structures

According to the focus of development and the expectations placed on the networked operations by companies, the transformation of recent supply chain structures, from the early 1990s up to the present day, can be roughly categorized into three distinctive evolutionary phases:

¹⁴ Heikkilä (2010) considers communications rich if they can overcome different frames of reference to facilitate the transfer of information between various communities of practice, or if they can clarify ambiguous issues to change understanding in a timely manner. Communication types that require a long time to be understood or cannot overcome different perspectives are lower in richness.

¹⁵ Heikkilä (2010) relates structure to the degree of structuredness in regulative instructions. Highly structured coordination is in place when tasks and their interdependencies can be specified in advance of the accomplishment of the work.

- Phase 1 is where companies concentrate on the efficiency of their core logistics activities and the coordination of their internal processes. This type of relationship with other companies is mostly transactional, the focus of coordination being on the governance of inter-functional activities
- Phase 2 supply chains have their focus on exploiting limited business exchanges with first tier external parties. The relationship type best categorizing co-operation in this phase is standardized, for example, the supply network functions largely over multiple sets of dyadic relationships between a focal company (FC), its customers and suppliers on various tiers. The focus on coordination is designed to enable inter-firm cooperation.
- Phase 3 then is about taking the networked collaboration further to establish virtual corporations that transcend legal enterprise boundaries (Kumar & Van Dissel 1996) or dynamic collaborative relationships¹⁶ (Kemppainen & Vepsäläinen, 2003) between other companies and networks. Here the governance mechanism calls for the capability to coordinate network and/or supply chain wide arrangements between parties.

Kemppainen and Vepsäläinen (2003) conducted longitudinal research on the transformation of industrial supply chain structures. In their work they built on the work of Bowersox and Closs (1996) to define different supply chains types and characteristics (see Figure 8 & Figure 9).

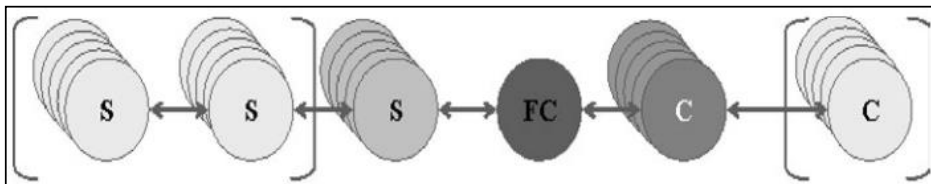


Figure 8 Supply chain operating via multiple dyadic relationships (Bowersox & Closs 1996)

Figure 8 depicts a traditional supply chain type of arrangement for collaboration that roughly correlates with the characteristics of the first evolutionary phase (Kemppainen & Vepsäläinen 2003). In the supply chain the collaboration is based on multiple dyadic business relationships encapsulated around a focal

¹⁶ In their article Kemppainen & Vepsäläinen refer to collaboration as the most strategic capability of extended supply chains, and they move the term beyond the development of dyadic buyer to supplier relationships to also include viewpoints that facilitate real-time information sharing within a supply chain (2003, p.3).

company and its requirements. In this type of collaboration the information sharing and visibilities – upstream (towards suppliers (S)) and downstream (towards customers (C)) – within the network are often limited.

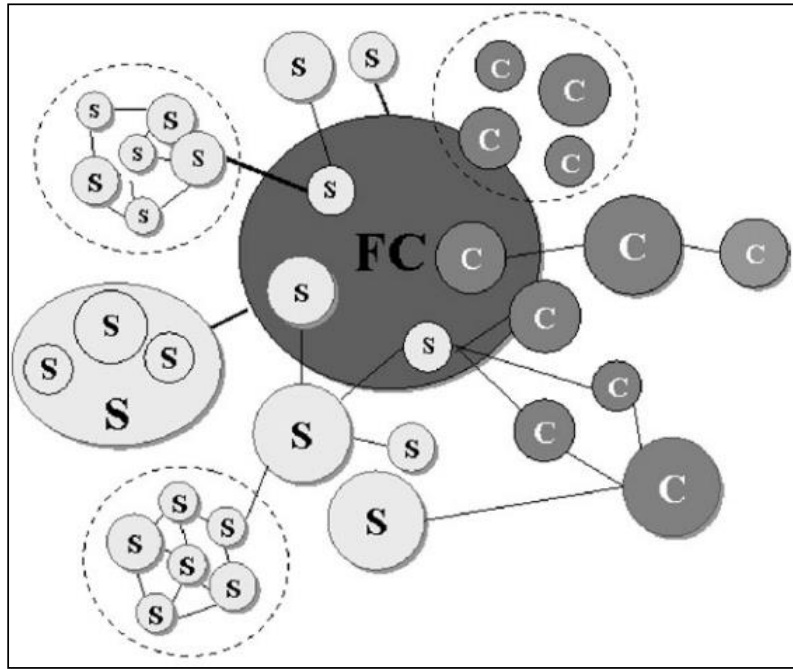


Figure 9 An example of an emerged and encapsulated supply chain (Bowersox & Closs 1996)

Figure 9 illustrates a supply chain structure composed of a focal company (possibly) encapsulating, for example, the nested and outsourced functions and dynamic collaborations within business networks. The emerged and encapsulated supply chain corresponds roughly with the description and characteristics of the second and third evolutionary phases (Kemppainen & Vepsäläinen 2003).

Kemppainen and Vepsäläinen (2003) highlight the differences between these distinctive supply chain phases to include the viewpoints on the extent of data sharing within the network, the types of network roles and the increased use of standardization and modularization as means to respond to increased market complexity. The expectations of flexibility built, into both the network and its operations, to mitigate the increasing uncertainty of business operations, are naturally also embedded. (ibid., p. 3)

What then drives these changes are the industries and markets that both evolve and transform over time. Means & Schneider (2000) in the beginning of the 21st

century proposed a summary of the changes in the ways organizations conduct business when the organizational focus shifts from a product-focus towards a customer-focus (see Figure 10). This tendency emphasizes the importance of customer relationship management (CRM) and the use of the outsourced mode of operation (Heikkilä et al. 2003).

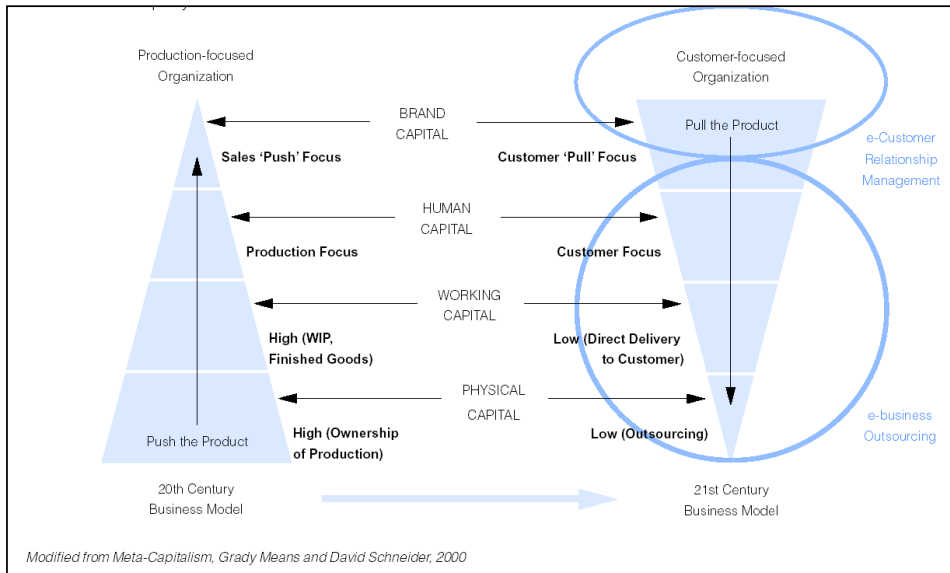


Figure 10 Changing industrial organization (Means & Schneider, 2000)

Figure 10 highlights how, by extending the interface between companies, both a collaborative network and its customers are often able to benefit from a deepened customer relationship. The possible benefits for network focal companies and network partners including, for example, enhanced visibility and communications as a source of information. This source of intelligence may, when used smartly, lead to network companies being better able to foresee and adapt to changing market conditions as well as tune and balance their offerings against customer demands, or even come up with totally new revenue streams (Christensen & Raynor 2003; Govindarajan & Kopalle 2004). For customers, increased visibility may lead to mitigated supply risks through the supply chain and enable the better planning of future actions.

In a study made in the beginning of the 21st century, Kempainen and Vepsäläinen (2003)¹⁷ investigated the transformation trends of supply chains and

¹⁷ "From Supply Chain to Networks -A study of SCM Practices in Finnish Industrial Companies". The study conducted interviews with 25 Finnish industrial companies operating in six supply chains or networks 2002-2003 (Kempainen & Vepsäläinen, 2003).

the networks of Finnish industrial companies between 1990 and 2010. Through their work, important information on the perceived valuation of certain supply relevant functions – based on the perceived locus of power for industrial companies, and on the changes in the same over an extended time period – become visible (see Figure 11).

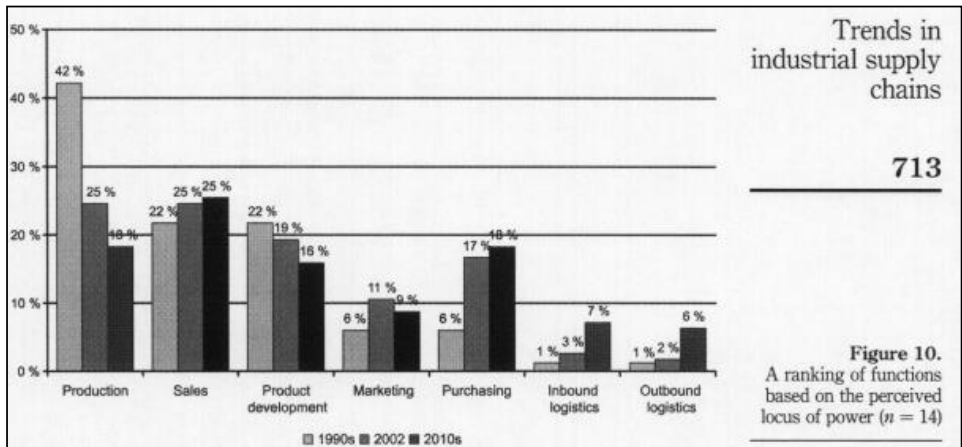


Figure 11 Trends in industrial supply chains (from Kempainen and Vepsäläinen 2003)

Figure 11 illustrates the results of a study depicting how fourteen Finnish industrial companies rank certain company functions based on the perceived locus of power. Later these transformation trend results were again re-investigated by Vepsäläinen (2009) in conjunction with a TEKES research project.¹⁸ The follow-up research provided the results visible in Figure 12, which correlated well with the previous findings. Despite the relatively small size of the companies in both of the above mentioned studies, the results confirm the relative importance of the various function-specific capabilities that the strategies of the companies required, although these strategies and capabilities also varied over time. The results also indicate the rising importance of customer intensive functions for the focal companies of the networks.

¹⁸ A prior study questionnaire (Kempainen & Vepsäläinen, 2003) was sent to the companies participating in Tekes (National technology agency of Finland) project "Globaalit arvoverkostot". Responses were received from ten companies. The report is available in electronic form at Tekes (http://www.tekes.fi/Julkaisut/globaalit_arvoverkostot.pdf. Retrieved 7 April, 2014).

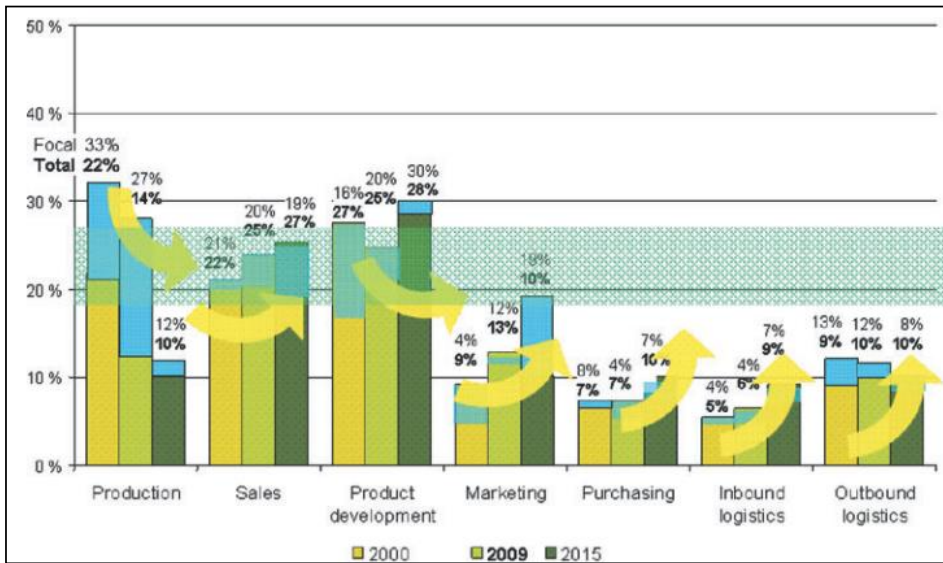


Figure 12 Core capability development trends (Vepsäläinen 2009)

As Figure 12 shows, the perceived importance of the production function (manufacturing) has, as a locus of power, continuously decreased. At the same time, the importance of the product development (a.k.a. R&D) function becomes the most important function. Customer interfacing functions, for example, in sales and marketing also increase.

On an operative level, Kärkkäinen et al. (2007, p. 265) identified transaction processing, supply chain planning and collaboration, and order tracking and delivery coordination as the three categories representing the roles played by the interfirm information systems in SCM¹⁹. However, they leave out the drivers of the use of these different types of interfirm IS (ibid., p. 265).

2.7 Chapter summary

The literature review on collaborative business networks illustrated the evolution of these collaborative value creation systems from the early context of simple dyadic supply chains to the modern, complex and – the most often seen form – reciprocal supply networks of today. The role of financial realities, the enabling role of IT, and the changing business objectives, needs and requirements of com-

¹⁹ Kärkkäinen et al. (2007, p. 265) define SCM as, “[The] practices and processes aiming for the effective and efficient flow of materials and information between a company and its immediate suppliers and customers.”

panies in response to, or in the creation of, disruptions were illustrated by some of the visible drivers of the companies' continuing use of networked collaboration in order to achieve their operative as well as strategic targets.

This chapter built on two distinct viewpoints. Firstly, companies are economic actors that, in addition to any possible shared collaborative targets of the network, have their own business targets and their shareholders' interests to satisfy. Secondly, the companies are fundamentally social constructs (Forsman & Nurminen 1994; Achrol 1997) that – as independent economic actors – require coordination and alignment to function and thus collaborate accordingly as a network and in a network (Heikkilä 2010). The select typology of the VCS structure impacts on the roles of participating companies, and on the explicit level of the required coordination. Furthermore, the network typology and their associated coordination capabilities were shown to embed multiple considerations as a result of the distinct, and potentially misaligned, viewpoints of their network participants, for example, the network focal company and individual network participants.

The role of financial realities, the enabling role of IT, and the companies' changing business objectives, needs and requirements in response to, or in the creation of, disruptions were discussed as drivers of the companies' continued use of networked collaboration. For many companies, their collaborative business networks remain a viable solution for keeping up with rapid change in the business environment, and the achieving of their operative and strategic targets.

Transaction networks and co-creation networks were illustrated as two fundamentally different types of network structures, which make distinct requirements on the openness of a company's individual and collaborative business models. The chosen network typology, and the role of individual economic actors within the collaboration are demonstrated as being significant for the coordination, management and performance of a collaborative network, and are thus identified as important elements to be acknowledged in the design and strategizing of a collaborative business model.

3 DISRUPTIVE INNOVATION AND COLLABORATIVE BUSINESS MODELS

In this chapter the concepts of disruptions and collaborative business models are approached and discussed as interdependent topics. The chapter introduces the concepts of disruptive innovation, and networked innovation, and utilizes the two to highlight different business models in order to clarify their typology, and therefore their distinct capability requirements regarding the aim and targets of the inter-organizational collaboration. The various networked innovation concepts are introduced in this chapter along with a consideration on the suitability of these approaches in conjunction with distinct network structures representing the distinct business models. The chapter finishes with a classification of the distinct innovation systems and the types of business models, which are based on the level of the innovation system required: dependency, openness and interaction amongst collaborative partners.

3.1 Disruptive innovation

Disruptive innovations conceptually serve as the embodiments of disruptions (disruptive changes) that companies, individually – as well as through various collaborative VCSs – deliver in the market place. Disruptive innovations are, in the existing literature, approached from multiple angles. Some of these existing research streams discuss disruptive innovation and the changes it delivers, in terms of innovative technology (Christensen 1997; Bouwman et al. 2009; Sainio et al. 2012), innovative products (Christensen & Raynor 2003; Markides 2006; Bouwman et al. 2009; Sainio et al. 2012) and/or the effect of innovations on companies' business models (Chesbrough 2003, 2007, 2010; Markides 1997, 2006; Hamel 2000; Christensen & Raynor 2003; Bouwman et al. 2009; Sainio et al. 2012). Some other streams of research assume a wider perspective and evaluate disruptive innovations in terms of strategy (c.f. 'value innovations' by Kim & Mauborgne 2006), or as being (one of many) parameters driving requirements for business model definition (Bouwman et al. 2009; Teece 2010; Rajala et al. 2012), and the strategy renewal of companies (Mintzberg 1978; Kim & Mauborgne 2006).

Within a more practice-based viewpoint, according to a categorization by Baiyere & Salmela (2013, p. 3-4), research on disruptions can be categorized according to its emphasis on investigating, for example, the role of IT in disruptive innovation (Downes & Nunes 2013), the role of IT as disruptive innovation (Lucas & Goh 2009; Lyytinen & Rose 2003), and the use of disruptive IT (Elie-Dit-Cosaque & Straub 2011).

Viewpoints assumed in the existing literature highlight the need to consider the distinctive views of disruptive innovations – such as disruptive innovations as strategy, disruptive innovations in the context of business models, disruptive innovations and IS/IT, or disruptive innovations as conceptualized at the level of product disruptions, or technology disruptions – as separate research topics and dependent on the context and emphasis of the inquiry being conducted (Pettigrew 1987, 1990a; Markides 1997; Hassett & Paavilainen-Mäntymäki 2013).

Sainio et al. (2012, p. 591) approaches the concept of disruptive innovation (“radical innovations”) as a source of competitive edge for companies in terms of technology, market position, and customer value. Bouwman et al. (2009) correlate innovation disruptiveness with the creation of new types of markets (c.f. Blue Ocean strategy by Kim & Mauborgne 2006). They state:

“... whereas sustaining innovation simply makes a product better, disruptive technological change [disruptive innovation as a disruption] creates new markets by introducing a new kind of product or service, which costs less than existing products or services based on old technology.” (Bouwman et al. 2009, p. 3)

Both Bouwman et al. (2009) and Sainio et al. (2012) distinguish disruptive innovation from incremental, sustaining innovation that is based on the realized business impact caused by, or through means of, disruptive innovations. Their definitions (Bouwman et al. 2009; Sainio et al. 2012) complement the conceptualization of, the so called ‘value innovation’ that Kim & Mauborgne (2006, p. 37-39) define as a specific type of disruptive innovation that is capable of the shifting existing boundaries of industries, or even creating new ones. These value innovations optimize the associated costs of the creation and delivery of an innovation and the value proposition of a company for its consumers. According to Kim & Mauborgne (2006) value innovations are the key competitive advantage in a so called ‘Blue Ocean’ strategy, which enables companies to unleash their innovation potential and move beyond being limited by the existing boundaries of both their field of operation and customer offering (ibid., p. 38-39).

The above views emphasize the potential for disruptive innovations to materialize as a significant change that alters the competitive status quo of both individual companies and collaborative business networks (Tushman & Anderson

1986; Sandström 2010). Combined with the views of Kim & Mauborgne 2006 and Bouwman et al. (2009) in particular, they highlight the capability of disruptive innovations to create new markets, disruptive innovations can be said to have the potential to affect the business models of both individual companies and those of collaborative business networks, or even to be considered as a business model challenge in itself (Christensen 2006; Sandström 2010).

Disruptive innovations provide the punctuation for independent and collaborating companies in the anticipation or realization of their business impact. As such, disruptive innovations force companies to either act, or to choose not to do so. Sainio et al. (2012) state:

“Depending on the competitive landscape, a new innovation may require a radically new business model from the perspective of an individual firm, in other words it may exhibit high business model radicalness” (ibid., p.592)

In a networked context the impact of disruptions may be considered significant, as each individual company’s reaction – as a response to a disruption may, either positively or negatively – affect the whole collaborative business network as well as an individual company’s value creation logic.

Disruptive innovations play a significant role in both a company’s individual firm-level success and the success of the collaborative business network. Depending on the type, nature and the level of a company’s radical nature, every company will, most likely, experience the effect of the same disruptive innovation in a different way (Bouwman et al. 2009; Sainio et al. 2012). As a consequence, the impact of an innovation may be experienced on the level of the network, or require new forms of collaboration. In the words of Bouwman et al. 2009:

“A radical or disruptive as well as incremental or sustainable technological innovation may lead to important changes in the structure of the value network and in the business model of the actors of these value networks.” (ibid., p.3)

Within the context of collaborative business networks,²⁰ Sandström (2010, p. 53) describes disruptive innovation as having the potential to “distort the firm’s existing network constellation and [that] may break the established linkage between value creation and appropriation.” Emphasizing the role of individual network participants as independent social constructs (Forsman & Nurminen 2004) and economic actors, the introduction of disruptive innovation within an established collaborative business network may thus result in diverging, even conflicting, incentives amongst partners (Sandström 2010). In the context of collaborative business networks, disruptive innovations may thus act as a change driver within an established VCS, challenging the appropriateness of a company’s existing collaborative business model, network structure, governance mechanism and the roles of the actors.

3.2 Collaborative business models

Business models encapsulate the design and implementation of the specific strategies of companies. In other words, they describe the boundaries for a company, or a set of companies as a network, in order to execute their required economic transactions according to the requirements of the business a company is in business for. Business models – through the multilateral relationships, interdependencies, and interrelated activities of the involved companies – stretch out beyond a firm’s boundaries (Itami & Nishino 2009; Sandström 2010). Collaborative business networks, based on a company’s targeted value creation logic and necessary structural considerations, include the necessary consideration of the focal company, its customers, and the necessary network for executing the delivery of the offering. Customers as well as suppliers are therefore seen as its key elements – within both the boundaries of a company’s independent and collaborative business models.

According to Chesbrough (2010, p. 2)²¹ a business model:

- Articulates the value proposition in a manner that describes the value created for users,
- Identifies a market segment and specifies the revenue generation mechanism,

²⁰ Sandström refers to ‘established networks’ (2010, p. 53) whereas the term ‘collaborative business network’ is used here to highlight the economic, business-driven, nature of the value creation system.

²¹ An interested reader should also read Chesbrough & Rosenbloom (2002)

- Defines the structure of the value chain required to create and distribute the offering ,
- Details the revenue mechanisms by which the firm will be paid for the offering,
- Estimates the cost structure and profit potential,
- Describes the position of the firm within the value network linking suppliers and customers, and
- Formulates the competitive strategy by which the innovating firm will gain and hold an advantage over rivals.

Osterwalder and Pigneur (2002) summarize this notion and define business models simply as:

“[Business model] is nothing else than a description of the value a company offers to one or several segments of customers and the architecture of the firm and its network of partners for creating, marketing and delivering this value and relationship capital, in order to generate profitable and robust revenue streams.” (Osterwalder & Pigneur 2002, p. 2)

Business models may be described as dynamic conceptualizations that exist for certain pre-defined purposes, and which are composed of both tangible as well as intangible elements (Aspara et al. 2011a). Business models capture an element of managerial cognition (ibid.) and have a lifespan. This lifespan is naturally dependent on its capability to fulfill its set objectives and purposes, and it is therefore subject to change when disruptions and disruptive changes emerge. As Tikkanen et al. state:

"New business models mutate from the existing stock of business model components as a consequence of long-term co-evolutionary relationship between the business model of the firm and the context in which it operates." (2005, p. 802)

In competitive markets and industries, business models are susceptible to external disruptive innovations that may render the business models of companies (individual as well as collaborative) obsolete (Chesbrough 2010; Aspara et al. 2011a, 2011b). The joint efforts of companies to define and decide on their collaborative business models may be seen as an embodiment of collaborative strategy creation, executed through a collaborative business network. Bouwman, Fa-

ber, Haaker, Kijl and DeReuven (2008) emphasize this link between the strategy execution of companies and their business models by drawing a parallel between the two:

“To a large extent, strategies determine the basis of the business case: the concrete operational implementation of business strategy in a business model.” (ibid., p. 32)

Business models require management and coordination throughout their life-cycle (Heikkilä 2010). This highlights the distinct capability requirements associated with the creation, execution, coordination, and transformation of business models at different times as well as the operational collaborations that require specific competencies from individual companies, plus networks of companies – if a business model is to be realized. Chesbrough (2010) discusses the matter by referring to what he calls the “business sense” of companies in requiring the development of capabilities that can produce innovations in their business models. As he points out “[one and the] same idea or technology taken to market through two different business models yield two different economic outcomes” (ibid., p. 354). Chesbrough (2010, p. 356) even goes as far as to claim business model innovations are of equal value to companies as their efforts in technological (innovation) development.

The capability to create, react to and/or exploit different types of innovations, for example, sustaining innovation and disruptive innovations, should be planned for in both the individual business model of companies as well as the collaborative business model shared by the business network participants (Bouwman et al. 2009; Valkokari et al. 2009; Sainio et al. 2012; Rajala et al. 2012). Associated with the capability of disruptive innovation to create distortion within collaborative business networks (Sandström 2010), the capability to plan for and ensure the strategic flexibility of joint operations is required if the collaborative business network is to be sustained and to perform as intended over a long period of time. Due to the possible competence destroying (Tushman & Anderson 1986) capability of disruptive innovations, the emergence of such a change driver may, for the network, result in a sudden dependence on resources beyond the boundaries of the established network, or in conflicts of interest amongst collaborative partners (Sandström 2010). Therefore, the capability to modify the structure, for example, to include and remove participants into or from a network, become critical.

Largely rephrasing the definition provided by Osterwalder & Pigneur (2002), Bouwman et al. (2008) then proceed to provide their definition of a business model. Their definition describes the specification requirements for business

model implementation – according to the business model dimensions discussed above:

“A business model is a blueprint for a service to be delivered, describing the service definition and the intended value for the target group, the sources of revenue, and providing an architecture for the service delivery, including a description of the resources required, and the organizational and financial arrangements between the involved business actors, including a description of their roles and the division of costs and revenues over the business actors.”
(*ibid.*, p.33)

Building on the earlier work by Prahalad and Bettis (1995) and Chesbrough & Rosenbloom (2002), Chesbrough (2010, p. 358) notes the “success of established business models [to] strongly influence the information that subsequently gets routed into or filtered out of corporate decision processes”. This tendency enables companies to remain focused and to identify the relevant from the irrelevant – as perceived from the viewpoint of a successful business model. While helpful in overcoming issues associated with, for example, the balancing of resources amidst market uncertainties and the abundance of irrelevant information (*ibid.*), this – in a networked context – emphasizes the importance for the collaboration to have access to capabilities related to factual foresight and business model renewal.

In this doctoral dissertation, business models are conceptually understood to comply with the logic of Bouwman et al. (2008), albeit approached from the collaborative business network viewpoint. Therefore, collaborative business models are, for the purposes of this thesis, defined as:

A collaborative business model – embedded in a collaborative business network – is a blueprint for the network participants as it describes the elements necessary for the delivery of their joint offering. Collaborative business models are managed so that they remain operational and current and also require this management. Furthermore, collaborative business models describe the intended value for the target group, the sources of revenue and provide an architecture for the delivery of the offering, including a description of the resources required and the organizational and financial arrangements between the business actors involved, including a de-

scription of their roles and the division of costs and revenues between the business actors.

3.3 Networked innovation and collaborative business models

Innovations and knowledge are often the gems that organizations aim to uncover and safeguard in the hope of exploiting them in the future and realizing their benefits. In the context of collaborative business networks the issues concerning impact, management, ownership, use, and value share (regarding the innovations and benefits delivered) amongst partners is a potential source of controversy, requiring attention (Kumar & Van Dissel 1996; Christensen 1997).

The importance of innovations as a source of competitive advantage, and innovation management as a cause and response to market disruptions, increases in inter-organizational networks (Chesbrough 2003, 2007, 2010). On a larger scale, innovations are crucial for the significance and, in the long run, the relevance and existence of a business network and industrial ecosystems.

Networked innovation and innovation systems have been researched as separate topics in the prior literature, but as Valkokari et al. (2009) point out:

“Even though researchers agree on the importance of networks as a new type of organizing, little is known about the challenges that the networks place on the innovation across the boundary of the firm” (ibid., p.2).

This is especially true in the context of the complex, less hierarchical formations of firms such as industrial ecosystems, which are often composed of several independent actors and business networks. Whereas these industrial ecosystems by themselves enable and constrain the operations of their participants, this coordination may often be based on more tacit, rather than explicit, knowledge and coordination methods pertaining to, for example, the rules of conduct.

Amit and Zott (2001) identified novelty, lock-in, complementarities and efficiency as the key aspects pertaining to the willingness of companies to engage in business model innovation. Christensen (1997) identified the root cause of tension that prevents the innovative exploitation of disruptive technologies (disruptive innovation) as resulting from the conflict between the existing business models of companies and the business model required to exploit emerging opportunities. Therefore, a shared innovation in a network context introduces requirements regarding the level of the collaborative business models of the companies involved. Valkokari et al. (2009) describe these requirements by stating:

“[shared innovation] requires each firm to open up its business model, to let more external ideas and technologies flow in from the outside and let more internal knowledge to flow out to the outside.”
(*ibid.*, p.2)

This definition in itself contains a notion of power distribution and dependence (Kumar & Van Dissel 1996; Chesbrough 2003). Furthermore, in terms of purposeful knowledge sharing amongst network participants, it contains requirements concerning the business value of the shared innovation. On one hand, the business value that the shared innovation yields must be significant enough to justify the resulting changes associated with the utilization of the innovation. On the other hand, the business value resulting from the utilization of the shared innovation must be perceived as fairly distributed amongst the network participants.

The question therefore becomes: how can business models and networks that support the periodical renewal of their embedded business logic be constructed and managed, while maintaining the capability to create and exploit innovations in a timely way? Naturally, all this has to be done in a manner that simultaneously acknowledges a company’s distinct nature and its roles and responsibilities as both an individual enterprise and as a collaborative network participant. Thus, in business networks and industrial ecosystems one of the key challenges has become the question:

“[how to] ... support, contribute and utilize the networked innovation within and across the boundary of the [individual] firm”
(Valkokari et al. 2009, p. 2).

The European Commission defines innovation management as follows:

“The concept of innovation management encompasses an integrated approach to managing all dimensions of innovation, from innovation in products, services and business processes to organisational and business models, through continuous monitoring, development and improvement processes.” (European Commission)²²

²² European Commission”,
http://ec.europa.eu/enterprise/policies/innovation/glossary/index_en.htm#i
(retrieved 27.2.2013)

Extrapolated into a network setup, innovation management can be described as an approach that requires that an explicit understanding and agreement exists amongst the network participants in all the phases of the network lifecycle. A dilemma emphasized by the fact that those very same innovations may require significant as well as unforeseeable changes to be made to the existing business model, network structure, and participant roles at virtually anytime. Some changes may impose significant power shifts and result in changes to a business network's governance structure. For an individual company, innovations may thus turn out to be either opportunities or threats.

Building on the definition made by Swan & Scarborough (2005)²³, Valkokari et al. (2009, p. 4) derive certain characteristics to describe, and constrain, the concept of networked innovation:

“We define the concept of “a networked innovation” to have the following characteristics: 1) there is always a specific purpose for collaboration, 2) although multiple actors are involved in the innovation, the collaboration is seldom open for everyone and, 3) the collaboration covers both the knowledge transfer and the co-creation activity between actors. Therefore, networked innovation is a hybrid form of organisation, having both elements from hierarchies and markets. In other words, the coordination is based on both control-governance and self-organization and there are both weak and strong ties between actors. These coordination mechanisms are critical to understanding how the networked innovation will re-shape the role and structure of the firm.”

As evident from the above definition, the management of networked innovation imposes major requirements on the flexibility of the business models of both individual companies as well as the business network as a whole. Whereas the network development lifecycle – in other words, the stage and maturity of the specified value creation logic that a firm/network is tuned to exploit – may require the business model to be configured one way, the arising ad hoc opportunities from innovations may pose other, even contradictory, requirements. In this thesis I use the above definition of networked innovation provided by Valkokari et al. (2009).

²³ According to Swan and Scarborough (2005) networked innovation appears from relationships negotiated in an ongoing communicative process relying on neither market nor hierarchical mechanisms of control.

Several concepts that characterize and distinguish between the different aspects of networked innovation are presented in the literature. Table 4 is a slightly modified version of the networked innovation concepts classification provided by Valkokari et al. (2009, p. 4). It aims to correlate various networked innovation concepts with different collaborative business models, which are represented as different business networks. The point of the table is to demonstrate that when these concepts are evaluated from the viewpoint of the collaborative value creation logic of networked companies, we can clearly identify the underlying requirements regarding, for example, the openness and interaction of companies, which can vary significantly.

Table 4 Networked innovation concepts and their relevance to different business models (adapted and modified from the work of Valkokari et al. (2009, p. 4))

Networked innovation concept (authors)	Approach	Business Model
Co-creation (Hippel, 1988)	Finding of innovative ways of co-creating value with customers, a technique for finding unique competitive advantage.	Individual Enterprise
User driven innovation (Ward, 1996)	Systematic approach to develop new products and services, building on investigation or adoption of users' life, identity, praxis, and needs including unrevealed needs.	
Co-configuration (Victor & Boynton, 1998)	Multiple collaborating producers that need to operate in networks within or between organizations; mutual learning from interactions between the parties involved in the configuration actions.	Value Chain
Creation nets (Hagel & Brown, 2006)	Creation nets implement a set of institutional mechanisms designed to mobilize independent entities in the pursuit of distributed, collaborative and cumulative innovation. These creation nets are assembled by a network organizer who serves as gate-keeper, deciding who will be able to participate in the network and defines fundamental governance processes to coordinate the activities of the network.	Business Network
Extended enterprise (Dyer, 2000)	Competitive advantage is jointly created and shared among team of enterprises working together in intimate, trust-based relationships to develop, produce and deliver complex products. Supplier involvement and co-design are other key concepts related to extended enterprise.	
Alliance constellation (Das & Teng, 2002)	Alliance constellations differ from simple bilateral, dyadic alliances because they are a "collection of several alliances" among players in a certain industry.	Industry Ecosystem
Business ecosystem (Iansiti & Levien, 2004)	Business ecosystem describes a loose network of suppliers, distributors, outsourcing firms, makers of related products or services, technology providers, and a host of other organizations, and is affected by the creation and delivery of a company's own offerings.	
Open Innovation (Chesbrough, 2003)	An open innovation means that firms make greater use of external ideas and technologies in their own business, while allowing other firms to utilize their unused ideas.	

The strategic orientation of a network, for example, the type of customer service offered and the focus on the product- and/or services-based business of the companies, naturally has a significant impact on the capability requirements of the collaboration, as well as on the expected development of the business relationship. To evaluate the effect that organizational conditions and capabilities have on the innovation capability of companies (and networks alike), Sainio et al. (2012) examined the role of company specific strategic orientations according to

customer relationships and technology. This effect was analyzed over three distinct dimensions: 1) technological radicalness, 2) business model radicalness and 3) market radicalness²⁴. They discovered that the technology orientation of companies increased the “radicalness of innovations” on all distinct dimensions. Customer relationship orientation, in turn, was noticed as affecting all dimensions apart from market radicalness (ibid., p. 593-597).

The results indicate (Sainio et al. 2012, p.597) that innovation output radicalness increases in all dimensions when technology oriented companies – irrespective of current customers – follow technological leads. Interestingly, the results indicate that while a customer relationship orientation boosts the innovation capability of companies, it may negatively impact on their long-term sustainability in cases where existing markets become exhausted. Regardless of the companies chosen strategic orientation, the need to avoid the so called, innovator’s dilemma (Christensen 1997), the tendency of successful companies to overly concentrate on present needs and, at their peril, to ignore the future needs of customers, is critical for the sustainability of networked business models.

Figure 13 illustrates the dependencies between business model structures and their associated innovation management concepts (requirements). It is worth pointing out that the looser the collaboration is – less formal governance and explicit knowledge in the collaboration – the more complex it becomes to anticipate the future business model structure, actor role and capability requirements.

²⁴ Sainio et al. (2012) defines the dimensions as follows: Technologically radical innovations represent clear advances in the state-of-the art technology and provide better performance functionality. Market radicalness refers to innovations characterized according to the difficulty of evaluating potential customer reactions beforehand. Innovations characterized as market radical require major changes in thinking and behavior by mainstream customers. Business model radicalness refers to the measures a company, or companies, need in order to implement their business model so that it can successfully exploit innovations.

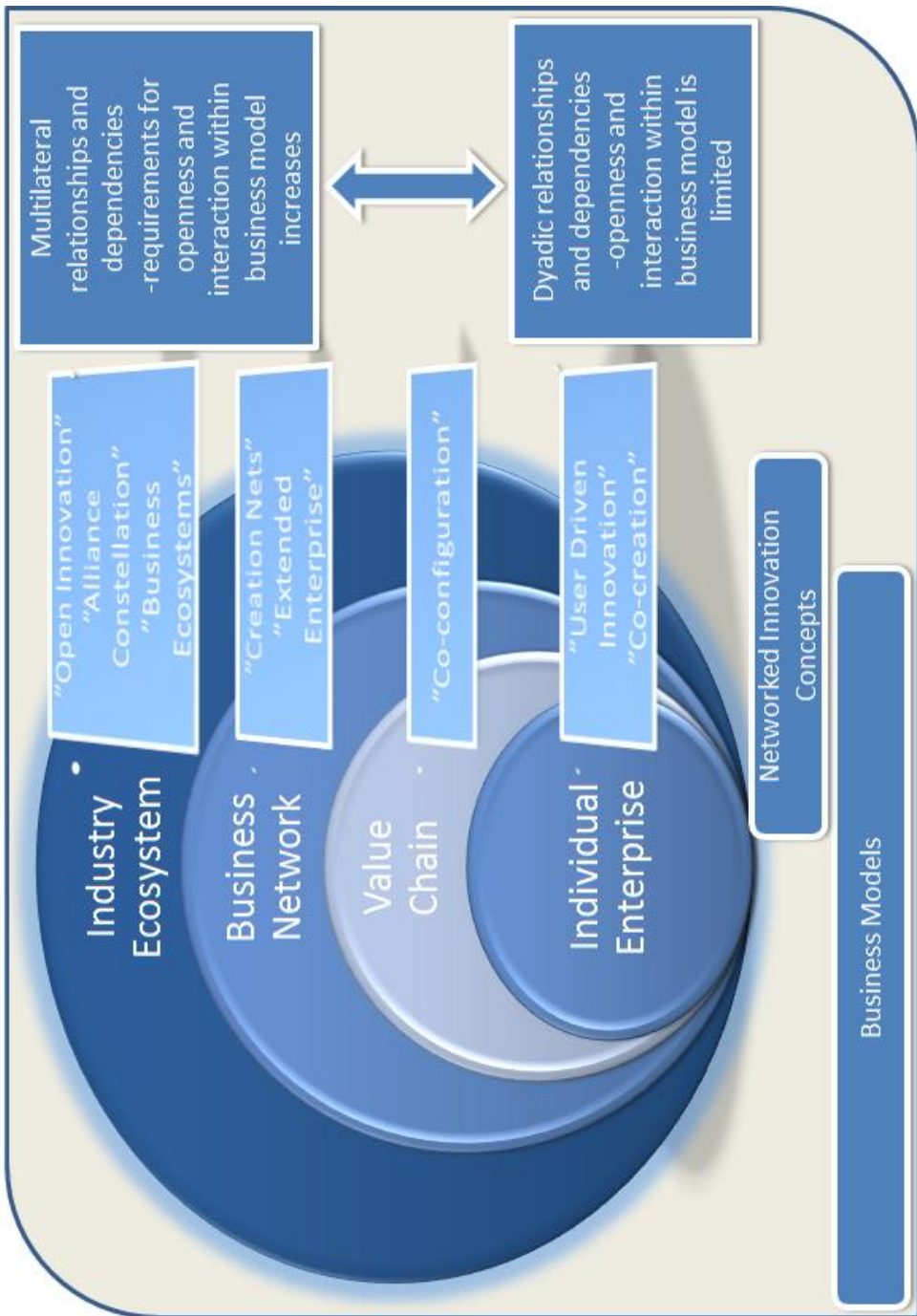


Figure 13 Innovation systems with varying levels of openness and interaction that are associated with different types of business model structures

Figure 13 illustrates the interdependencies and openness of the business models of companies and the differences between various business model structures, as illustrated by different network typologies. Associated with the interdependent power of innovations and disruptive business models in challenging the dominant logic of industries and reshaping value chains (Sabatier et al. 2010) is the idea that the network structures of companies must be flexible enough to enable them to be transformed in a way that reflects the requirements of disruptive innovations.

The needs and capabilities of networked innovation management inherently differ within distinct network structures according to the goals of the collaboration. Transaction networks, typically being a version of more constrained and hierarchical business relationships, may expect the information exchange and interdependence of companies to lie mostly between the dyadic business relationships of companies. Co-creation networks, which are inherently more ambiguous regarding their expectations for the outcomes of the joint innovation management of the companies involved, require and benefit from business models that are more open (Chesbrough 2007) as well as the reciprocal sharing of information within the business network and industry ecosystem.

3.4 Chapter summary

The literature analysis performed on disruptive innovation – as an archetype of the more generic concept of ‘disruption’ and collaborative business models – was performed to highlight the interrelation of the two concepts. The analysis highlighted the ability of companies to successfully manage and exploit innovation in collaboration with other companies as having a strong dependence on the collaborative business model design, network typology, and the longer-term operational sustainability and relevance of the collaborative network.

Disruptive innovation was used as a concept to paint a picture of the potential impact of radical business innovations (c.f. value innovation by Kim & Mauborgne 2006) on company strategies and business models (Bouwman et al. 2009; Sainio et al. 2012). The distinct networked innovation concepts for collaborative innovation management place distinct requirements on the collaborative business models (Christensen 2006; Bouwman et al. 2009; Sandström 2010; Teece 2010). Consequently, some networked innovation concepts are more suited to utilization as part of a certain type of network than others, for example, they are based on different network typologies that are more suited to supporting multilateral dependencies and open information exchange amongst network partners.

Collaborations and their associated business models are not alike. The different purposes of networked collaboration, according to their set targets and objectives, call for varying levels of structure and communications. As such, the level of coordination differs under different business models and is dependent on, for example, the uncertainties and variability pertaining to internal as well as external interfaces (Heikkilä 2010). The exploitation of an individual company's innovation capabilities as part of their collaborative business models will typically require inbuilt or inherent openness and interaction between the parties. The next requirement is that a shared and predefined collaborative business model that is flexible enough to acknowledge the individual company's role and value share – which results from the use and exploitation of their knowledge and innovation capability as part of and throughout the life-cycle of the collaboration – must be created (Osterwalder & Pigneur 2002; Bouwman et al. 2008; Chesbrough 2010).

4 FOCAL COMPANY STRATEGY

Chapter four discusses the focal company strategy and, as a distinct domain of the study, provides a literature review of its relevant concepts. In this chapter the interrelation and impact of strategy and strategy changes on the collaborative business models of companies and their different types of inter-organizational networks are discussed. The chapter aims to highlight the dependencies between the nature and impact of disruptions for the planned as well as actualized strategy of companies and the effect on their business models. For this purpose, the generic dimensions of strategy are interpreted as distinct business model elements. The chapter then continues by discussing the linkage between strategy and operations in individual organizations and in collaborative business networks, and presents implementation as the process for achieving the required collaborative business model alignment at the relevant levels of and between the individual organizations and the network as a whole. The chapter ends with the introduction of the technology frames as both a concept (Orlikowski & Gash 1994) and as a framing process (Davidsson 2006; Kaplan 2008) that can be used to achieve and support strategizing (Håkansson & Ford 2002; Gadde, Huemer, Håkansson 2003) between collaborating companies.

4.1 Viewpoints on strategy

In the existing literature, strategy is often presented as a mere conceptualization of (an intended) plan (Mintzberg 1978). Combined with operational effectiveness, it is sometimes also evaluated as an essential ingredient for superior performance (Porter 1996). By assuming a wider perspective, strategy may also be viewed as a process (Plourde 2013) that, both in its creation and transformation, is influenced by the views (Tversky, Slovic & Kahneman 1982) and inter-organizational cognitive heuristics (Aspara et al. 2011b) of those involved in its making. Porter assumes a similar process view, defining strategy for companies as being about the creation of unique, valuable, positions involving a different set of activities (1996, p. 18).

Mintzberg (1978, p. 934) defines two viewpoints on the strategy of organizations: 1) strategy as a premeditated plan made before the execution of a specific

decision (intended strategy), and 2) actualized strategy (realized strategy) as a “pattern in a stream of decisions”. These definitions are not mutually exclusive, rather they highlight the nature and interdependence of strategy and the environmental context of the companies in which the strategy is executed.

Disruptions may affect the status quo of the competitive environment of companies and alter the conditions upon which their strategy is based. These disruptions may force companies to re-engage in the strategy formation process, or, if they lack such a systematic approach, face the implementation of situated actions in response to disruptions that later on can be evaluated as forming a pattern in a stream of decisions and which becomes a realized strategy in itself (Plourde 2013). For the purposes of this doctoral dissertation both of these notions of strategy are assumed and, in fact, needed contextually (ex post facto) in order to analyze the differences between the intended and realized strategies of the focal companies amidst disruptive changes within their industries and over an extended period of time. In the words of Plourde (2013, p. 115):

“Studying strategies over time through the identification of patterns of actions can be used to compare different behaviors over time, or to analyze similarities and differences in patterns of actions within an organization”.

Doz & Kosonen (2013) define the strategic agility of companies as their capability to think and act differently. Agility embeds expectation regarding the ability of a company to possess real-time capabilities for accurate foresight, as well as to rapidly and collectively – with partners, suppliers etc., commit to and target the required resources to exploit opportunities. Whereas companies may be agile in terms of being able to reasonably quickly transform some of their strategic assets and business model elements according to the needs of their newly identified or arising opportunities, some other aspects, such as core competencies, core technologies, tacit knowledge and competencies and some business relationships with suppliers, are more difficult to move (ibid., p. 30-33).

In situations where companies are increasingly concentrated on their core competencies and, as a result, more dependent on other companies to deliver their customer offering (Clemons et al. 1993), there is an emphasis on the need for the companies to plan beforehand and prepare for their collaborative business model and the embedding of the required elements and capabilities for agility.

4.2 Focal company strategy and collaborative business models

Kim and Mauborgne (2006) describe two types of market environments – red oceans and blue oceans – to highlight the role of the pre-meditated strategy and business models of companies as a competitive asset. Red oceans are defined as environments with defined and generally accepted boundaries for their field of operation, and where the rules of inter-organizational competition are acknowledged. In red oceans the main competitive strategy of companies is to overcome their competitors by grasping as much of the market share as possible. With the increasing maturity, saturation, and commoditization of these limited red oceans (markets), the companies opportunities for growth and profitability become challenged. Blue oceans, in turn, are defined as unexploited market spaces possessing potential for the generation of new types of demand, and therefore offering the companies opportunities for substantial growth in the absence of fierce competition and complementary offerings (*ibid.*, p. 24).

A summary on the differences between red oceans and blue oceans is illustrated in Table 5. Blue oceans may be created within the boundaries of existing industries and fields of operations but that, depending on the qualities of the disruptive (value) innovation as the companies' unique customer offering, may also result in the creation of something completely new. The key essence of blue oceans becomes the capabilities of the companies to redefine their market and offering and, figuratively speaking, rise above the competition. By doing so, the companies are able to break free from the boundaries that limit the red oceans and make the competition insignificant. As such, successful blue oceans allow companies to define their offering without the need to make a balance between the costs and the value offered to customers as means of differentiation. (Kim and Mauborgne 2006)

Table 5 Summary of the differences between the red ocean strategy and the blue ocean strategy (modified from Kim & Mauborgne 2006, p. 39)

Differentiating Factors	Red Ocean Strategy	Blue Ocean Strategy
Defined and limited markets	Competition within and for the defined markets	Creation of new markets and segments without competition
Role of competition	Head-on-Head type of competition to outperform rivals	Competition is insignificant
Type and nature of customer demand	Exploitation of existing demand	Creation of new demand
Customer offering (key success factors)	Balance between the costs and customer value	No need to choose between the cost and customer value
Business model (key success factors)	Optimized to achieve either desired level of customer offering differentiation , or lowest possible operating costs	Optimized to achieve customer offering differentiation and lowest possible operating costs

Within the context of collaborative business networks it becomes important to emphasize the relationship of strategy to the sustainability and operability of the collaborative business model constructed around the needs of the focal company in its industrial context. In generic terms, markets and investors appreciate predictability and stability as witnessed, for example, by the behavior of stock exchange rates falling amidst, even speculated, market uncertainties. Similarly, for individual economic actors, operating with known and trustworthy partners helps to minimize operative risks and provide stability and assurance regarding the collaborative operations (Heikkilä et al. 2003; 2004). In a stable environment and conditions the capability of companies to recognize, predict and foresee issues that potentially concern their daily operations are improved and reduce the need for coordination (Ouchi 1980; Heikkilä 2010). A stable organizational environment therefore enables companies to better align their individual and collaborative interests and create joint value at a lower transaction cost (Ouchi 1980). The permanence of a business relationship is also one of the factors that, in part, justifies incurring the cost of IT investments for individual companies, and allows the collaborating companies to minimize the risk and fear of opportunism (Ouchi 1980; Clemons et al. 1993; Kumar & Van Dissel 1996).

Stability and permanence are factors that enable the collaborative efforts of companies to continue over extended periods of time without a mandatory, rushed need to reassess the validity of the shared strategy intent their collabora-

tive business model embeds. A volatile environment and disruptive events have the opposite effect. In fact, extreme uncertainties and opportunism may increase the transaction costs of companies (Ouchi 1985), for example, due to increased coordination needs (Heikkilä 2010).

External factors, such as disruptions, as well as internal factors, such as availability and access to resources, may cause a focal company to undergo a strategy formation process (Mintzberg 1978). As a strategy formation process is often irregular (*ibid.*), it may occur by the focal company implementing decisions that may not fully, or even at all, be aligned with its current intended and stated strategy, and which its collaborative business network is constructed to reflect and is based upon. In highly volatile markets with multiple continuous and often parallel changes, the focal company may not even consciously engage in this strategy formation process but rather, in response to external factors, take situated actions that display uniformity and consistency and later become its realized strategy (Mintzberg 1978). For the validity of the shared collaborative business model, and for the overall sustainability of the collaborative network, these focal company strategy changes may provide possibilities for renewal and result in increased opportunities and value, or render the collaboration obsolete.

Kemppainen and Vepsäläinen (2003) introduce the following dimensions that make up strategy and play a part in determining how companies set up and organize to compete and deliver their intended customer offering:

- Generic strategy of a company,
- Dominant type of customer service offered,
- The scope of the industrial role,
- The scope and mode of operation, and
- The organizational structure of the company

These strategy dimensions are equally applicable in the context of both individual companies, and collaboration. In other words, they represent strategy level considerations that need to be agreed upon and addressed in the collaborative business model of the collaborative business network. As such, these strategy dimensions represent those opportunities and commitments that form the basis for the collaborating companies to sufficiently align their individual strategies, goals and financial incentives under one collaborative business model governing their joint efforts. Naturally, what then follows is that intended as well as realized focal company strategy changes reflect on their collaborative business model, which then requires attention and management to be kept in balance.

By emphasizing the economic aspects of collaboration, a recent study by Stenström-Iivarinen (2011) investigated the communication of strategically significant topics as well as the key success factors for the business-to-business relationships between the focal company (as a buyer) and its suppliers. The study was conducted in the high-tech electronics manufacturing industry, and based its findings, foremost, on the empirical information gained through a series of senior-level interviews within the focal company and its selected suppliers. Her study concluded that the key success factors of the sustaining inter-organizational relationships lie in the “tangible factors, such as profitability, costs, technology and quality” instead of factors such as “trust, commitment, communication and co-operation” (ibid., p, 183).

To better understand the interrelation of a company’s individual and collaborative strategy considerations regarding the collaborative business model, a deeper examination of the composition of the latter is needed. Bouwman et al. (2009, p. 2), in line with the works of Osterwalder & Pigneur (2002), group the elements of a business model under the following four domains:

- Service domain: describing the value proposition and market segment where the offering is targeted,
- Technology domain: covering the aspects of the technological requirements that are needed to realize the plans,
- Organization domain: for the planning and preparing of the required value creation system and/or business network, and
- Finance domain: for value creation logic, investment and risk planning

Table 6 provides a summary of the interrelation of collaborative business model domain specification needs and the strategic dimensions that affect the collaborative delivery offerings of companies. “The generic strategy of a company” refers to the overall motivation of the company to be in business. As such, it serves as the fundamental guideline anchoring the company to its individual economic realities. The generic strategy of a company impacts on its position within a network and guides its willingness with regard to other questions concerning its collaboration and across all business model domains. As engaging and committing to collaboration requires investments, involves inter-organizational dependencies, and gives rise to lock-in effects, a company’s expected return on its investments must exceed the associated costs of becoming a partner in a networked collaboration (Gadde et al. 2003).

“The scope and industrial role of the company” positions the collaborating company’s objectives and role in the delivery of the offering in relation to its core-competencies, available capabilities and resources. Regarding the finance domain of the collaborative business model, the scope and role of an individual

company within a collaborative business network needs to provide economic incentives to justify an individual company investing and participating in collaboration.

“Dominant type of customer service offered” refers to the definition of the type and extent of the company’s individual offering, for example, whether a company engages in transaction based business, offers consultancy services to customers, or both. In the collaborative network context this customer service dimension relates to the offering/service domain of the collaborative business model, impacting, for example, on the composition of the network (needed roles and actors) as based on the requirements of value creation.

“The scope and mode of operation” describes the company’s plan regarding their individual and collaborative market reach. Related to the technology domain of the collaborative business model, it requires that the collaborating companies agree on the needed structures and mechanisms for the offering to be made available. For example, companies must consciously decide on the network design and typology of their collaborative business network.

“The organizational structure of the company” relates to the organizational domain of the collaborative business model by describing how the collaborative companies individually and within the context of the collaboration organize their structures to fulfill their promises to customers most effectively.

Table 6 Summary on the interrelation of collaborative business model domains with distinct strategy dimensions

Collaborative Business Model Elements	Strategic Dimensions Affecting a Company's Ability to Deliver an Offering	
Finance domain	The scope of their industrial role	Generic strategy of a company
Offering / service domain	Dominant type of customer service offered	
Technology domain	The scope and mode of operation	
Organization domain	Organizational structure of the company	

4.3 Linking of strategy and operations in individual organizations and in collaborative business networks

Figure 14 (Heikkilä et al. 2010) illustrates the link between company strategy, its business model options, process model details, and operational processes and business rules. An enterprise architecture-based view of a company is utilized to represent those distinct intra-organizational views and architectural levels requiring the company's strategic intent and business model to be consciously reflected upon.

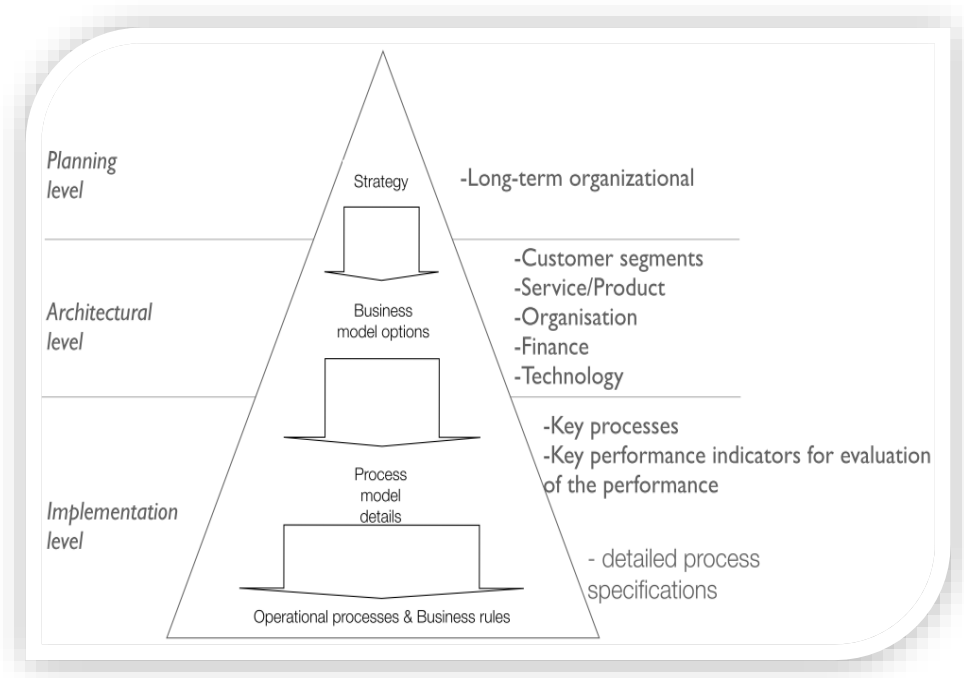


Figure 14 Linking of strategy and operations in an organization (from Heikkilä et al. 2010)

Figure 14 highlights the relational dependency between the generic strategy of a company and its execution, and it reminds us of the multiple aspects that must – as part of an organization’s business model – be tuned according to the company’s operations and remain in sync with them. Starting from the planning level, a company needs to have a generic strategy that is to be realized. In this context the nature of the generic strategy of a company serves as a long-term plan describing the context and premises for the operative execution of the company. The general strategy of a company forms the basis for the company’s individual operational model, describes the company offering and target markets, and provides the guidelines regarding the internal capabilities required, e.g. technology, processes, etc. At an architectural level the generic strategy of a company is embedded in one or many business models that describe the specifics of the ways and the means that the company will use to fulfill its long-term plan. The implementation level is about arranging the required organizational alignment and capabilities so that the company can execute its plans accordingly.

Figure 15 is an illustration showing the collaborative strategy and operations of companies in the context of a collaborative business network. The illustration

highlights the increased complexity associated with the alignment of the operations of multiple organizations, as individual social constructs, under one collaborative business model.

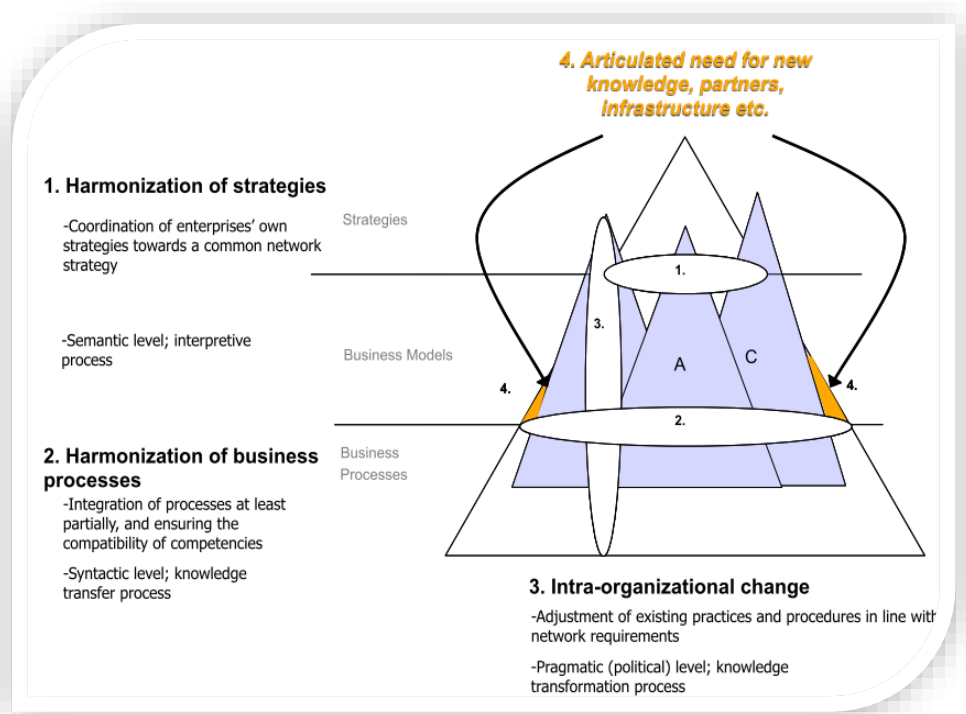


Figure 15 Linking of strategy and operation in a network context (adapted from Heikkilä et al. 2010)

In Figure 15 the large white triangle in the background represents the defined collaborative domain of the companies' collaborative business model. In other words, it encapsulates the set business objectives and boundaries for the collaboration. Smaller triangles, labeled A-C, represent the participants of the networked collaboration whose operations need aligning under a collaborative business model. The planning level of collaboration is described through the notion of strategy. In the context of a collaborative business network, and depending on its assumed structure and typology, the goals and objectives of the collaboration are typically derived from the generic (intended) strategy of the network focal company. On the level of the collaboration, however, the process strategy harmonization to align individual companies' objectives, goals and targets is referred to by Håkansson & Ford (2002) as the process of "strategizing" and described as being about:

[I]dentifying the scope for action, within existing and potential relationships and about operating effectively with others within the internal and external constraints that limit that scope. (Håkansson & Ford, 2002: p. 137)

For individual network participants, strategizing is needed to solve three managerial paradoxes to form the collaborative business model of the business network (Håkansson & Ford 2002). First, each network participant must find an optimal balance between simultaneously operating independently in the market and committing to being part of and operating according to the business rules of a collaborative business network (Gadde et al. 2003). Second, they have to place the organization's individual goals, objectives and benefits in the collaborative business model by balancing "the interplay between influencing others and being influenced" (ibid., p. 358). The third managerial paradox refers to finding and agreeing on the adequate levels of control required for governing the collaboration in a manner that enables the collaborative goals of the business network to be met while maintaining the innovation potential and capability of the network (ibid., p. 358).

The harmonization of business processes takes place at the architectural level of the collaborating companies. On that level, the focus is to turn the semantic representation of the collaborative business model into, at least partially, integrated processes and ensure the compatibility of the individual competencies of the companies and knowledge sharing between the collaborating organizations (Heikkilä et al. 2010).

The compatibility of the collaborating companies' actual working practices for the operative execution of the joint offering takes place at the implementation level of the collaborating companies. Often, if not always, when aligning and orchestrating the operations of individual actors towards a common goal, certain areas where there is a lack of expertise, capacity, etc. are discovered. In Figure 15, these are highlighted as gaps between the networked business model and the individual network participants. Depending on the severity and impact of these gaps the business network may then need to find a way to mitigate it by either creating a workaround or by finding a complementary new network partner to satisfy these identified needs.

4.4 Network interdependencies and the roles of the actors

Gadde et al. (2003) state that the distinctive views of strategy for individual companies will differ depending on the type and level of interdependency a company is involved in. These views highlight that the role of strategy for an individual company is primarily “about winning” (c.f. Grant 1998, p. 3). Hence, associating strategy with competition, and the competitive actions of companies inside and outside of networks.

In the network context, the competitive strategies of the companies and the focus of their strategic management are affected by the collaborative business model and the interdependencies of the network partners. Depending on the nature and structure of the network, collaboration may, for individual companies, only provide some value-added on top of its own customer offering, but they may also provide a company with its only way to gain access to some required competencies or resources in order to compete in the first place. Therefore, in the network context, an individual company needs to find a way to balance between optimizing its own performance as an individual actor and the “competitive interactions with other” companies (Gadde et al. 2003, p. 358). The focal question for an individual company within a network context therefore becomes: how can it execute those strategic actions “to influence its position in the network of which it is part” (ibid., p. 358).

The role and position of a company within a business network has a significant impact on how it perceives the network. Figure 16 provides an example of two distinctive network typologies: aggregation typology and value chain typology (Tapscott et al. 2000).

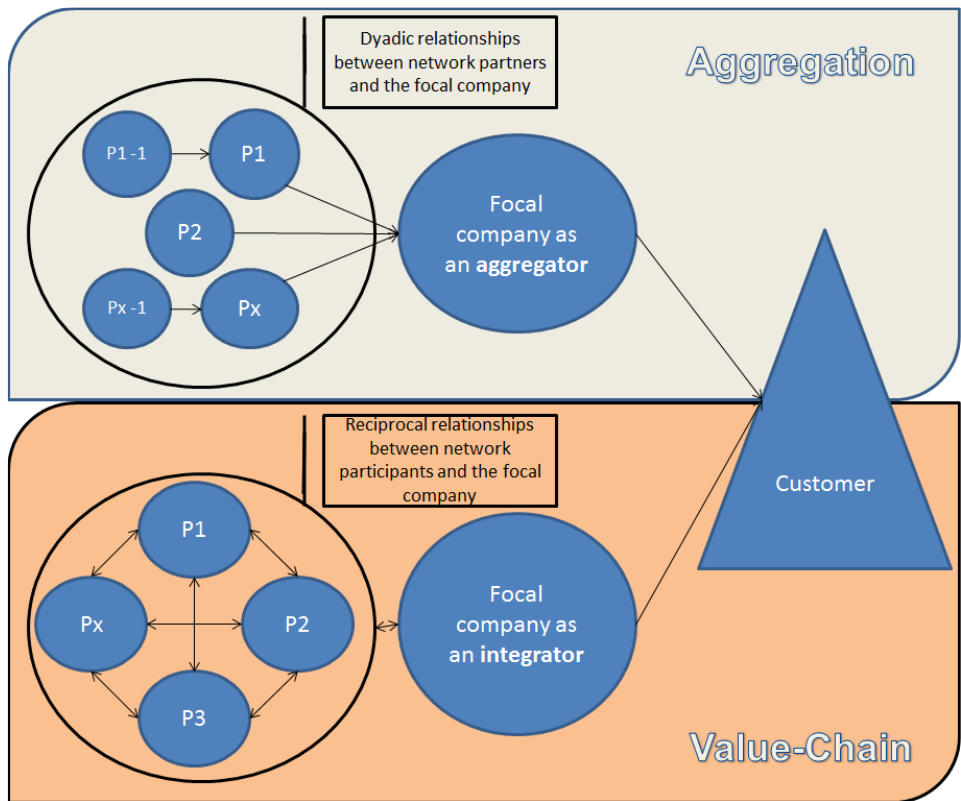


Figure 16 Aggregation and value chain typologies (modified from Tapscott et al. 2000)

Figure 16 illustrates two network typologies: the aggregation network typology, and the value chain network typology. Both of these typologies are categorized as representing hierarchical b-webs emphasizing the role of the focal company in coordination and value-creation (Tapscott et al. 2000). Under the aggregation typology, a focal company operates as the “aggregator” of the collaborative business network, leading the functions and activities²⁵ of its networked collaboration in a hierarchical fashion (ibid., p. 32). Aggregation typology is furthermore characterized as representing a low value integration, which, in the context of collaboration, translates into minimal interaction between the dyadic relationships of the separate value chains within the network. The focal company’s

²⁵ An aggregator’s tasks include taking responsibility for selecting products and services, targeting market segments, setting prices and performing the other tasks needed to ensure market fulfillment (Tapscott et al. 2000, p. 32).

role in the network therefore becomes its ability to act as an intermediary in the exchanges between the network participants, for example, between suppliers and service providers. The controlling role of an aggregator is a network typology that ties up much of the focal company's resources in coordinating the activities and functions of its network. It furthermore represents a structure where the need for shared strategy and alignment between collaborating parties is restricted by the need to work between the focal company and the individual nodes of the chain, rather than within the network as a whole.

The value chain typology is associated with high value-integration and is therefore closer to being theoretically 'value net like'. Network partners share reciprocal relationships with each other, and thus are more empowered and independent in their exchange than under an aggregation typology that emphasizes the mediating role of a focal company. A focal company that oversees the functions and activities of its network is, in the value chain typology, called an integrator. The integrator has the ultimate responsibility for the actions and operability of its supply web and ensuring that the functioning blanket agreements with each supplier are extensively used (Tapscott et al. 2000). Under value chain typology, an integrator unites the collaborating companies in terms of providing the overall objectives and goals for collaboration. However, as the collaboration is based on reciprocal collaboration and information sharing amongst the collaborating companies, there is a greater need for the companies to share and be aligned under a shared strategic intent that governs their way of working and provides a code of conduct for the collaboration as a whole.

When these two network typologies – aggregation and value chain – are considered, for example, within the SCM context and perspective, the following observations can be made. First, under both network typologies the formation of network partners downstream, from the viewpoint of a focal company, resembles a supply network composed of a multitude of independent actors. However, from the network partners' viewpoint these same nodes point upstream towards the focal company and may not at all resemble a network, but rather a traditional hierarchical supply chain (Heikkilä et al. 2003). Second, in both of the network typologies under examination here, the network is structured so that the focal company controls the customer interface. These typologies therefore demonstrate the structure of a network as embedding hierarchy and the position of individual companies within a networked collaboration, thus signifying the differing power positions between the companies.

In self-organizing network typologies, such as agora and alliance (Tapscott et al. 2000), the coordinating role of any individual focal company within the collaborative business network is less clear, or even nonexistent. Under these more free-forming (agora typology) as well as 'loose' relationships and interdependencies between individual companies (alliance typology), the common 'scope for

action' needs to be recognized in collaboration with current and possible future partners (Gadde et al. 2003). The key success factor for the strategy implementation thus becomes "how the strategy of the individual firm[s] relates to the ambitions and activities of those relevant others" (Gadde et al. 2003, p. 361).

The role and need for a shared network strategy seems to differ between the hierarchical network typologies constructed around the focal company needs and the self-organizing network typologies. For example, the study by Stenström-Iivanainen (2011) shows that the collaborative strategy, within hierarchical buyer-supplier relationships, is often dictated by the focal company, despite these strategy dimensions containing "subjects that define the role of suppliers and ways of working" (ibid., p. 190). This one-way strategy may lead to a lack of common understanding or agreement pertaining to strategy amongst the collaborative business network participants. As a result, this may lead to an increased need for coordination by the focal company with each individual network partner to ensure that the necessary strategy implementations are, within the collaborative context, adequately performed and disseminated throughout all levels of the network (ibid.).

4.5 Strategy realization

Companies may realize their collaborative strategies by engaging in collaborative business networks in two ways: 1) by becoming part of one from the beginning (the forming of a collaborative business network), or 2) by joining an existing collaborative business network. The possibilities for strategizing are different depending on the type, typology, the role of a company within the collaboration, and the life-cycle of the business network. However, and regardless of the method of how a company engages in the collaboration, it must carry out the necessary implementations to tune itself accordingly so that it is able to collaborate according to the expectations of the business network. Naturally, a change in the network composition or realized changes in the current strategy of the companies may also constitute towards changes in the prior operability of the network, thus requiring the network as a whole to transform and implement the required changes that can sustain it.

Implementation is often understood as a technical phenomenon starting from the gathering of requirements and finishing when a system functions according to its technical specifications (Kling & Allen, 1996; Heikkilä et al. 2004). This view contrasts with a more holistic viewpoint, where implementation is approached as a directed change process aimed at institutionalizing desired changes and im-

provements (Heikkilä et al 2003; 2004; Sissonen, Vahtera, Heikkilä & Virolainen 2006). The collaborative business model should therefore reflect the collaborative strategy of the companies (Bouwman et al. 2009). Hence, the implementation of separate business model elements should also be seen as the individual as well as cooperative efforts of companies to implement their desired strategy.

Heikkilä et al (2003, 2004) identified four broadly defined phases of implementation:

- Company's decision to implement: describing the stated willingness of the company to participate in networked collaboration and the depth and magnitude of its participation,
- Process of requirement gathering: the specification and building of the technical system so that it addresses the strategic and operative goals of the network and its individual participants,
- Introducing changes into the organization: so as to institutionalize the needed changes as practices, and lastly,
- Use and maintenance of process and system capabilities: to validate that the networked collaboration – as a sum of shared activities by multiple parties – performs according to expectations

Figure 17 illustrates the levels of a network and the interdependencies of these levels on the operability of the collaboration.

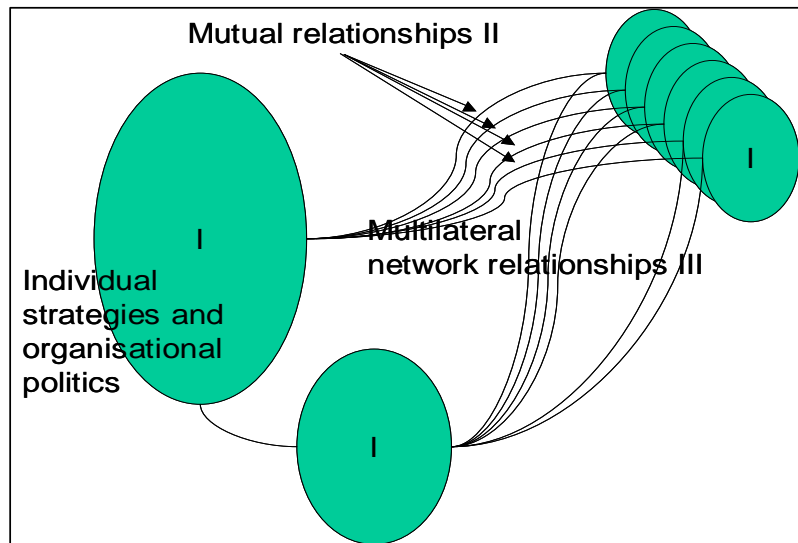


Figure 17 Three spheres of the network (adapted from Heikkilä et al. 2006)

Figure 17 highlights the scope of implementation in the networked collaboration context. Implementation is the vehicle that ensures that the elements required by the collaboration are put in place, institutionalized as practices and that the network, in its use-phase, operates as intended. To establish a functional network the requirements of a collaborative business model must be implemented in the three spheres of the network (Heikkilä et al. 2004):

- Within each individual company,
- In each dyadic relationship between the companies, and
- At the level of the network

In a study conducted by Heikkilä et al. (2004) some of the factors affecting the success of implementation in an inter-organizational setup were investigated. This work concluded the majority of implementation challenges resulting from people based issues, unclear or undefined roles, the characteristics of organizations, such as size and misaligned objectives and work tasks, rather than from information systems or processes. Their study furthermore highlighted the com-

plexities associated with implementation increasing in an inter-organizational setup where “the collision of the collaborating companies’ social structures is one definite source of implementation failures” (ibid., p. 2).

4.6 Technology frames and the process of framing

Understanding and verifying the strategic alignment of collaborating companies is difficult and also limited to the exact point of time of the evaluation. Furthermore, the distinct view of the individual network participants may substantially differ based on their role and position within the collaborative business network. This may be due to many reasons, such as the amount of money invested in and at stake for the collaboration, and the focal company’s inherent need to embed the relevant coordination and governance mechanisms for managing the collaboration. For some companies, such as focal companies and suppliers with deep supply chains, interests also expand throughout the often multiple network tiers of collaboration. The roles, responsibilities and risk awareness of network participants can therefore be demonstrated to have a profound impact on the considerations for the network, including those pertaining to the willingness of companies to invest in, and adopt the required technologies and processes for the operative execution of their role within the network (Vahtera 2001; Heikkilä et al. 2003, 2004).

A company’s stated and planned strategy may substantially differ from their realized strategy and result in misalignment between a company’s expected and actual execution (Mintzberg 1978). Being able to identify the disruptions constituting incongruence in a collaborative business model – and the resulting need for the (re)framing of their individual or collaborative strategy (Orlikowski & Gash 1994) – therefore becomes vital for the collaborating companies. The process of framing, to certain extent, also addresses the problems associated with the information of ambiguity amongst the companies, and hence can be used in the identification of the methods companies take to cope with it (Kaplan 2008).

To be able to identify these deviations, a mechanism to validate the congruence of the inter-organizational frames of reference is required (Davidson 2006). This mechanism must be able to pinpoint the possible incongruences between the collaborating companies planned (intended) business models and their operative execution as independent companies, and must do this within the context of the network. The technology and the process of framing provides an interesting viewpoint into the identification of the companies’ level of strategic alignment and the amount of possible incongruence between the collaborating companies planned and realized strategic actions (Orlikowski and Gash 1994; Davidson 2006; Kaplan 2008).

Heikkilä, Sajasalo and Heikkilä (2009) provide examples of cases where demonstrated incongruence between the frames and the network partners has led to the underutilization of the innovation capability of the networks. These examples identified three sources of incongruence resulting in conflicts of interest amongst the network participants in the following categories (*ibid.*, p. 8-10):

- Challenges related to the lack of management of intellectual property rights (IPR),
- Issues caused by the simultaneous requirement of companies to partner and compete against each other, and
- Individual companies issues with the balancing of resources between their simultaneous needs to autonomously function as independent companies, while committing and performing according to the ways-of-working of the business network

The management of IPR-related challenges directly impacts on the innovation capability of the business network to be effectively utilized. Without proper management, these issues may manifest themselves as trust deficit between the focal company and its partners (Heikkilä et al. 2009) and lead to the reduced performance of collaborative companies. The level of agreement between the network partners, including the ownership of IPR, must define the issues of ownership and the resulting value share between the collaborative parties.

The convergence problems identified by Heikkilä et al. (2009, p.9) as related to co-opetition of companies (Nalebuff & Brandenburger 2006; Brandenburger & Nalebuff 2011) resulted from misalignments between the focal company's stated network strategy and the actual execution of the collaborative business activities. Whereas the network strategy, firstly as a starting point and later as a cornerstone, for a networked collaboration may emphasize visions and targets related to partnership as well as the appropriate code-of-conduct and long-lasting relationship amongst partners, the actual behavior of companies in everyday business situations may not reflect these values. For example, in cases where a focal company has many complementary suppliers for a component, the lowest price usually dictates the supplier used.

All companies have limited amounts of resources. Therefore companies, at any given time, must allocate their available resources in a manner that optimizes the cost-benefit ratio. In a network context the availability and use of shared resources emphasizes the need for visibilities (Huhtinen et al. 2003) and governance (Kumar & Van Dissel 1996; Heikkilä 2010). From the visibilities point of view this requirement extends to uncover the possible gaps where the actual ver-

sus the intended operability of the network is compromised, which may cause an additional workload for one or many involved network participants.

To avoid such incongruence issues from occurring, the networked business model has to be systematically constructed. In more precise terms, this means that the business model design should, at all relevant levels, ensure the intended strategies are realized in action and that the mechanism to identify and manage possible incongruences is embedded in the design.

Orlikowski and Gash (1994, p. 175) argue that an understanding of people's interpretations of technology is critical in order to understand their interaction with it. By building on previously existing socio-cognitive research (see Bostrom & Heinen 1977; Nurminen 1986; Hirschheim and Klein 1989), they concluded by presenting technological frames as their theoretical approach, or lenses, for the study of the multiple interpretations that are related to information technology in an organizational context and in its specific domain. According to Orlikowski and Gash:

“Technology frame[s] identify that subset of members’ organizational frames that concern the assumptions, expectations, and knowledge they use to understand technology in organizations. This includes not only the nature and role of technology itself, but the specific conditions, applications, and consequences of that technology in particular contexts.” (Orlikowski and Gash 1994, p. 178)

Technology frames, as conceptual interpretations of technology, can be extended to consider the cognitions and values of the actors involved. The usability of technology frames in the context of networked business models is evident in the need for network participants to define and capture their shared network strategy, and to implement this on the necessary levels of the networked business model at a later date.

Technology frames provide an analytical perspective for the analysis of causalities, meanings and outcomes in a social setting where these would perhaps not otherwise be easily detectable via theoretical lenses that assume a more positivistic stance.

Technology frames, as meaningful domains of knowledge in their specific organizational setting and social groups are described by Orlikowski and Gash as:

“Webs of meaning ... collective cognitive elements that individuals draw on to construct and reconstruct their social reality... [These frames, of reference, as] cognitive structures or mental models ... are held by individuals [but] assumed to be shared by a number of

individuals when there is a significant overlap of cognitive categories and content” (ibid., p.178).

The views concerning the specific content of these technology frames naturally vary between individuals, situations and circumstances. Technology frames have nevertheless been successfully applied to accumulate interpretive knowledge from multiple research fields. For example, Orlikowski and Gash (1994) first coined the concept in a socio-cognitive research context where the applicability of the theoretical lens was demonstrated for the study of application of IT within organizations, and where technical artifacts and practices were treated as distinctive phenomena. Later, this same theoretical lens was applied by Bijker (1995) in a study concerning technological innovations from a social research viewpoint. Kaplan (2008) has utilized the process of framing in the context of strategy making under certainty.

As demonstrated through the multiple applications of the model, the definitions of and boundaries for the central concepts of the theoretical frames have not always been consistent. The value-added of the frames is, however, undisputable as the flexibility of the model allows the design of the technology frame content to be made at a sufficient level, thus meeting the conceptualization requirements of the situation and the participating social group²⁶ at hand. Through these frame conceptualizations, interventions can then be aimed at those elements where the frames differ between the actors. These interventions for overcoming frame incongruence are expected to lead to “[technology] frame alignment and improve organization outcomes” (Davidson 2006, p. 25).

Davidson (2006) states that by directing more research emphasis towards the frame structures, instead of the context dependent frame contents, the applicability of technology frames as a theoretical approach and the applicability for cross-case comparisons could be enhanced.²⁷ By examining a number of Technological Frames of Reference (TFR) studies, she then provides a categorization of technology frame categories and domains.

Three generic categories of frame domains are separately acknowledged to be widely applicable, according to the identified similarities of the frame domains used in the TFR studies (Davidson 2006). These frame domains are summarized

²⁶ Davidsson (2006, p. 25) states relevant social groups “[I]nclude individuals whose interactions and experiences with technology are similar. Group members tend to develop similar frames of reference that guide their understanding and uses of technology in similar ways.”

²⁷ Davidson also states “[S]tructural properties of frames could be assessed in more general, analytic terms; doing so could facilitate cross-cases comparisons and articulation of a more general interpretive theory of IT and organizational change” (2006, p. 28).

in Table 7. These three frames fit the concept of ICT supported network business models as domains where agreement and alignment are required for the collaboration to be put into place and function sustainably in the long-term. Successful framing may enable the better alignment of companies' intra- and inter-organizational strategies and the IT used for the collaboration. As such, effective framing may allow attributes of sociomaterial regulation²⁸(de Vaujany & Fomin 2007; de Vaujany, Fomin, Lyytinen & Haefliger 2013) to be tacitly built in and embedded as part of the collaborative business model. Throughout the course of collaboration this regulation – explicitly built into the operative business processes and practice – may facilitate learning and enhance the accumulation and transfer of knowledge amongst and within companies. Furthermore, this may reduce the need for additional and external coordination and intervention by decreasing the variation in the participants' behaviors (de Vaujany et al. 2013), and thus increase the overall efficiency of and for the involved parties.

²⁸ de Vaujany, Fomin, Lyytinen & Haefliger (2013, p.9) define sociomaterial regulation as regulatory processes that combine social rules with material artifacts, or apply social rules to govern practices involving material artifacts.

Table 7 Three Generic Frame Categories and the Frame Domains Identified in Technological Frames of Reference Studies (adapted from Davidson (2006, p. 27))²⁹

<p>Frames related to information technology (IT) features or attributes</p> <p>IT capabilities and design (Davidson, 2002); Nature of technology (McGovern & Hicks, 2004; Orlikowski & Gash, 1994; Shaw, Lee-Partridge, & Ang, 1997); Nature of user-centered systems development (Iivari & Abrahamsson, 2002); Requirements (Lin & Silva, 2005); Solution to the problem (Lin & Silva, 2005); The nature of problems (Lin & Cornford, 2000); Understanding of the problem (Lin & Silva, 2005); View of technology (Yoshioka, Yates, & Orlikowski, 2002)</p> <p>Frames related to potential organizational applications of IT</p> <p>Business value of IT (Davidson, 2002); Motivation and criteria for success (Iivari & Abrahamsson, 2002); Nature of technological change (Barrett, 1999); Rationale for technology (Yoshioka et al., 2002); Requirements for the system (Lin & Cornford, 2000); Technology strategy (McGovern & Hicks, 2004; Orlikowski & Gash, 1994; Shaw et al., 1997)</p> <p>Frames related to incorporating IT into work practices</p> <p>Issues around use (Lin & Cornford, 2000); IT-enabled work practices (Davidson, 2002); Nature of business transactions (Barrett, 1999); Technology-in-use (McGovern & Hicks, 2004; Orlikowski & Gash, 1994; Shaw et al., 1997); Use of technology (Yoshioka et al., 2002); Use of user-centered systems development (Iivari & Abrahamsson, 2002)</p>

The structuring of frames and frame categories to a level representing a conclusive set of structural parameters in order to create a recipe for success for all occasions is naturally a meaningless, if not impossible, task. This is because of the social context, content requirements and industrial domain causing variance for the frame parameters. Furthermore, as Davidson (2006) rightly suggests, the structural frame properties may longitudinally differ over time and, for example, over the lifecycle of an IT-project. However, these frames can be structured to the level representing the generic high level structural parameters related to the needed levels of rigidity and salience (Davidson 2002), and which have to be considered for ICT supported business models, so that they can be realized as sustainable networked collaborations.

²⁹ Davidson (2006, p. 27) also identified the following categories: Frames related to developing IT application in organizations; Other frame categories; Un-dimensional, social frame along with select frame domains used in TFR studies. These frame categories are however omitted from the purposes of this thesis.

Figure 18 summarizes the use of specific technology frame categories, each containing one-to-many frames, in a network context. It aims to highlight the relationship between the levels of strategy, operations and intra-company changes.

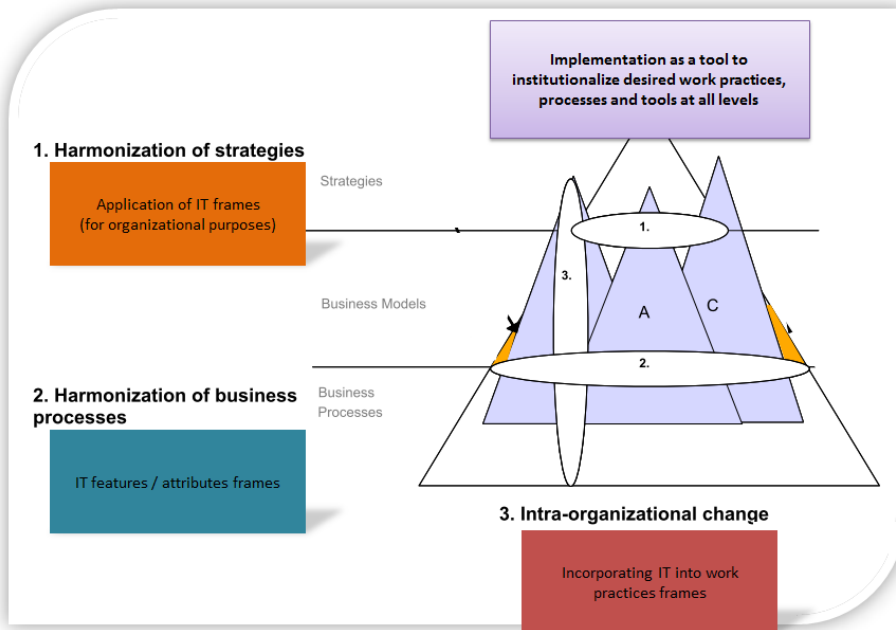


Figure 18 Use of technology frames and framing in the network context (modified from Heikkilä et al. 2010)

Figure 18 illustrates the use technology frames, in a process of framing, as tools for holistically designing and evaluating collaborative business models. In the process of framing (c.f. ‘strategizing’ by Gadde et al. 2003), the identified incongruence of the frames during implementation may actually lead and be used for the articulation of the identified gaps and for the planning of the organization’s interpretive change process. Following the same logic, the frames themselves can, to a certain extent, be used as artefacts to identify and measure the intended or unintended change in a frame or frames³⁰ towards the alignment required for implementation (Davison 2006).

³⁰ As Davidson (2006, p. 30) rightfully points out: “Change in interpretive processes [affecting their outcomes] can be triggered by many [internal as well as external] circumstances in which incongruence among groups’ frames may not be the critical factor”.

In this context it means that the intended collaboration as a value creation system must be designed at multiple levels and be seen to be relevant for enabling the realization of the collaborative strategies of all the companies involved. In Figure 18 these levels are identified as and cover the needs of strategy, collaborative business processes and the needs of each individual company as a network participant to execute their tasks according to the requirements of collaboration. Through the use of frames, the possible sources for frame incongruence can then be identified in terms of the articulated needs, and these issues can then be addressed accordingly at the appropriate levels of the business model. Furthermore, Figure 18 highlights the role of implementation as a tool and mechanism at all levels of the network and within each individual company, in order to institutionalize the desired design and put the parameters into practice.

4.7 Chapter summary

Chapter 4 approached the focal company strategy from viewpoints highlighting the unambiguous nature of the term both as a premeditated and intended ‘plan’, and as an ongoing process that is actualized through the “patterns in a stream of decisions” that a company executes (Mintzberg 1978). The nature and role of strategy in the economic value creation context highlights the companies need to periodically revisit and adjust their strategy to maximize their performance and shareholder value. As such, whereas the focal company’s strategy may change both as a reaction to, or in creation of, disruption, understanding the distinct dimensions of strategy (Kemppainen & Vepsäläinen 2003) – in relation to collaborative business model elements (Bouwman et al. 2009) – becomes crucial for the sustainability of the collaboration.

The interdependence of the companies’ strategy and its execution is critical when acknowledging the viewpoints of both individual companies and collaborative networks. In a manner similar to that of a single organization calling for alignment between its distinct planning, architectural, and implementation levels when executing its strategy, a network also requires the conscious alignment of strategies and business processes between the participating companies (Heikkilä et al. 2010). Furthermore, in an inter-organizational setting the necessary implementations for the collaborative business model to be holistically realized from plans to execution must be performed at the three distinct levels of the collaborative business network. These three levels are the levels of the dyadic business relationships between the companies, the level of the network as a whole, and

within the level of each independent company as a network participant (Heikkilä et al. 2003, 2006).

Strategizing (Håkansson & Ford 2002; Gadde et al. 2003) is a process similar to that of technology framing (Davidsson 2006). These tools are shown to be usable tools that enable the conceptualization of the necessary implementation layers – as specific technology frames (Orlikowski & Gash 1994) – that the collaborating parties deliberately need to work on in order to reduce ambiguity (Kaplan 2008), and to define the necessary specifications and reach congruence over their collaborative business model.

As the companies' roles and position within a network impact on the type and level of dependence between actors (Tapscott et al. 2000), the necessary detail that an individual company may need to engage in when framing varies according to the network type and the generic strategy and collaborative business model of the network. Categorizing transaction networks, embedding hierarchies and emphasizing the execution of the focal company's strategy emphasizes the role of the tangible benefits of individual companies (Stenström-Iivarinen 2011), whereas co-creation networks are more commonly based on and focus on the formulation and execution of the collaborative, common strategy of the companies in the hope of future benefits (Valkokari et al. 2009).

5 SCIENTIFIC APPROACH AND THE RESEARCH STRATEGY

This chapter aims to provide the reader with an understanding of the scientific approach chosen for the thesis. It presents the empirical cases this thesis derives its information from in detail, and highlights their significant contribution towards answering the research questions.

5.1 Research philosophy

Orlikowski and Baroudi summarize the differences between the philosophies of interpretivism and positivism by stating:

“A fundamental distinction between the interpretive and positivist world views is the former’s primary presumption of social constructionism. Interpretivism asserts that reality, as well as our knowledge thereof, are social products and hence incapable of being understood independent of the social actors (including the researchers) that constructs and make sense of that reality... The aim of all interpretive research is to understand how members of a social group, through their participation in social processes, enact their particular realities and endow them with meaning, and to show how these meanings, beliefs and intentions of the members help to constitute their social action.” (1991, p. 13)

Carson, Gilmore, Perry and Gronhaug (2001, p. 6) provide a summary, presented in Table 8, that highlights the differences between the positivist and interpretive world views.

Table 8 Broad definitions and explanations of positivism, interpretivism, ontology, epistemology and methodology (Carson et al. 2001)

Ontology	Positivist	Interpretivist
Nature of 'being'/ nature of the world	Have direct access to real world	No direct access to real world
Reality	Single external reality	No single external reality
Epistemology		
'Grounds' of knowledge/ relationship between reality and research	Possible to obtain hard, secure objective knowledge	Understood through 'perceived' knowledge
	Research focus on generalization and abstraction	Research focuses on the specific and concrete
	Thought governed by hypotheses and stated theories	Seeking to understand specific context
Methodology		
Focus of research	Concentrates on description and explanation	Concentrates on understanding and interpretation
	Detached, external observer	Researchers want to experience what they are studying
Role of the researcher	Clear distinction between reason and feeling	Allow feeling and reason to govern actions
	Aim to discover external reality rather than creating the object of study	Partially create what is studied, the meaning of phenomena
	Strive to use rational, consistent, verbal, logical approach	Use of pre-understanding is important
	Seek to maintain clear distinction between facts and value judgments	Distinction between facts and value judgments less clear
	Distinction between science and personal experience	Accept influence from both science and personal experience
Techniques used by researcher	Formalized statistical and mathematical methods predominant	Primarily non-quantitative

The ontological approach this thesis assumes is interpretive. It, in the words of Orlikowski and Baroudi (1991, p.5), "assume[s] that people create and associate their own subjective and intersubjective meanings as they interact with the world around them". Organizations for the purposes of this thesis "are not [considered] static ...and the relationship between people, organizations, and technology are

not fixed but [assumed to be] constantly changing” (Klein & Myers 1999, p.73). The researcher’s responsibility therefore is to “attempt to understand [studied] phenomena through accessing the meanings that participants assign to them ... [with intent] to understand the deeper structure of a phenomenon, which it is believed can then be used to inform other settings” (Orlikowski & Baroudi 1991, p. 5).

5.2 Empirical research strategy and methods

“Social process is not captured in hypothetical deductions, covariances, and degrees of freedom. Instead, understanding social process involves getting inside the world of those generating it” (Rosen 1991). Following this thought and as stated by Orlikowski & Baroudi (1991, p.8), “methodological assumptions [chosen] indicate which research methods and techniques are considered appropriate for the gathering of valid empirical evidence”. Due to the multi-disciplinary nature of this thesis and the distinct empirical case studies used for the data gathering, case research strategy is applied.

Figure 19 summarizes the interrelations and roles of research strategy, research philosophy, research methods, operative cases, practice and literature for the study of the defined research questions that form the context of the study.

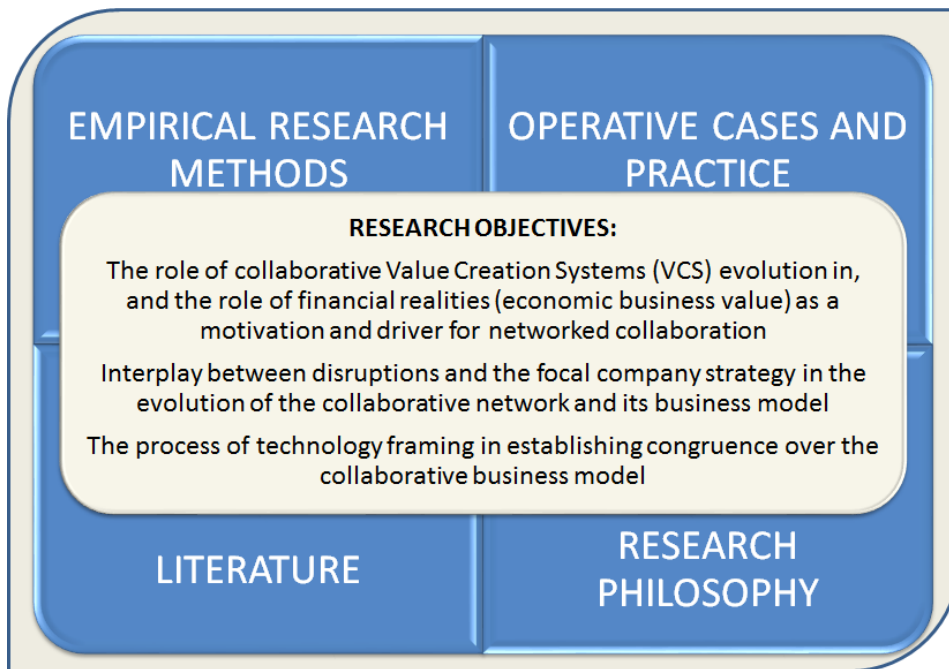


Figure 19 Relationship of the research strategy to theory, practical professional experience and empirical case evidence

The researcher's goals and the nature of the researched phenomena influenced the selection of the research strategy (Benbasat 1984; Koskinen, Alasuutari & Peltonen 2005). This thesis examines how focal companies that are experiencing market disruptions can exploit the opportunities that arise from the disruptions by using networked collaboration and business networks. Due to the practical focus on a contemporary issue facing many companies and the lack of established research and theories on the phenomena, case research strategy is particularly appropriate for adding to the subject area as it captures the knowledge practitioners can contribute towards the theoretical base that is forming regarding business models and collaborative networks (Benbasat, Goldstein & Mead 1987).

Due to the ambiguous definition and nature of disruptions, both as a concept and their applicability across multiple context areas, there have been calls for disruptions to be studied with a method of inquiry that is holistic, dynamic and provides contextual longitudinal analysis (Pettigrew 1987, 1990a, 1990b; Christensen 2006; Markides 2006; Hassett & Paavilainen-Mäntymäki 2013). Studies investigating certain disruptions or disruptive changes as single event or occurrences are not necessarily able recognize the "antecedents that give those events form, meaning, and substance" (Pettigrew 1990a, p. 269). What results is that:

“Such episodic views of change not only treat innovations as if they had a clear beginning and a clear end but also, where they limit themselves to snapshot time-series data, fail to provide data on mechanisms and processes through which changes are created.” (ibid., p. 269)

This thesis aims to provide a longitudinal contextualist analysis (c.f. Pepper 1942) with which to investigate the phenomena characterized by the (process of) change. Contextual analysis by definition is composed of both multilevel analysis and processual analysis, interconnecting the vertical interdependencies between the levels of analysis on the phenomena and by placing these levels temporally in time (Pettigrew 1990a). As such, according to Pettigrew (1990b, p.10), contextual research is “capable of drawing on concepts from a variety of disciplines and several levels of analysis.”

According to Pettigrew (1990a, p. 268), “practically useful research on change should explore the contexts, content, and process of change together with their interconnections through time”.³¹ It is therefore very fitting that, from the point of view of context, content and disruptions the time perspective this thesis adopts is longitudinal. That is to say that the evolution of the industries, the focal companies and their relevant business models and network constellations are evaluated in a continuum covering the time period from 2001 until 2012. According to the principle of case research, knowledge and learning is gathered by studying the actions and innovations implemented by practitioners (Benbasat et al. 1987; Koskinen et al. 2005).

Case studies, including reflections from practice as presented in the form of a field study, are used as the primary sources of the empirical evidence in evaluating theories and the findings of the earlier research literature. These case studies have all been executed for and/or in conjunction with businesses for a specific purpose. As such, the research methods exercised in the individual case studies have been chosen and implemented in a manner best believed to suit the individual case study’s needs to reach a good outcome. The detailed introduction of these studies as well as of the research methods used for data gathering and processing will be presented later in the thesis.

³¹ Pettigrew (1990a, p. 268) states, “Context [refers] to the outer and inner context of an organization. Outer context includes the economic, social, political and sectoral environment in which the firm is located. Inner context refers to features of the structural, cultural, and political environment through which ideas for change proceed”.

5.2.1 Applicative knowledge as a source of complementary value to theory

The applicative knowledge of professional insiders has, in the context of organizational learning, been investigated to identify how the practical knowledge of insiders can add value in and for the process of organizational inquiry and in disseminating knowledge between individuals and organizations (Argyris & Schön 1974, 1978, 1996; Evered & Louis 1981; Schön 1983).

Organizations have a twofold nature as both ‘environments of knowledge’ as well as ‘embodiments of knowledge’ where learning can take place ‘in-organizations’ and ‘as-organization’ (Argyris and Schön 1974, 1978, 1996; Liepshitz 2000). To address the issue of harnessing the prior knowledge, experience and reflection of a practitioner, in order to facilitate organizational learning, Argyris & Schön (1974, 1978, 1996) propose a process of organizational inquiry.

This process of organizational inquiry is ‘in-organizations’ and conducted by an individual member of an organization. The process is guided by the use of hypothetical constructs of the form, referred to as Theory of Action (TOA). The content and the form of these individual TOAs are influenced by the practitioners’ practice-based, prior and current exposure with and knowledge on the subject matter. Therefore, the practitioners’ accumulated professional knowledge guides both the practitioners’ perceptions of what should be done (espoused theories of action) as well as the actual actions taken to find optimized solutions for identified issues (theories-in-use). Hence, due to organizational inquiry, individual theories of action are created and enforced through organizational learning (Argyris & Schön 1974, 1978, 1996; Schön 1983).

Evaluating organizational learning from the perspective of learning-as-organization, Argyris and Schön (1978) further build on the concept of TOAs and extend their use from the individual level to the organizational level. Under these organizational TOAs, an organization’s culture, strategies, norms etc. are considered to be reflected in the creation, existence and implementation of both the espoused TOAs and in-use TOAs.

A practice-based research approach may intuitively be generalized as yielding additional value for academic inquiry. However, the methods for applying it in practice and the dissemination of accumulated organizational learning may be more difficult to generalize due to the context-specificity of organizational environments. As Lipshitz (2000) states, “whereas organizations learn through the learning of their members, what organizations know is not a simple sum of what their members have learned” (ibid., p. 461). Lipshitz (2000, p. 462). Furthermore he considers the process of organizational inquiry and its use of TOAs as “powerful heuristics of reflection and learning”. However, he says these approaches lack detailed specifications and detail pertaining to the practical application of their solutions in a real-life context.

The use of applicative knowledge for theory building and the validation of research findings requires a methodological, well defined approach³². Klein and Rowe (2008, p. 675) point out the value of practical experience for academic research on a general level and suggest professionally qualified doctoral students³³ have the type of applicative knowledge that may, for example, through greater symbolic capital, enhance the practical relevance of their work over other students.³⁴ They go as far as to argue that this tacit applicative knowledge, embedded in practice, can be considered “different from but of equal value to theory” (ibid., p. 675- 677). Within the ISS discipline the reflective practitioner approach has –as a research method (originally by Schön 1983) – been studied (Heiskanen 1994; Heiskanen & Newman 1997; Heiskanen et al. 2008) in order to demonstrate its relevance and suitability in the IS research context.

Concerning the study and analysis of change in a contextual mode, Pettigrew (1990a, p. 269) summarizes its key points as follows:

“... the key points to emphasize in analyzing change in a contextualist mode, are firstly the importance of embeddedness, studying change in the interconnected levels of analysis. Secondly, the importance of interconnectedness, locating change in past, present, and future time. Thirdly, the need to explore context and action, how context is a product of action and vice versa; and finally the central assumption about causation in this kind of holistic analysis, causation of change is neither linear nor singular – the search for a simple and singular grand theory of change is unlikely to bear fruit.”

This thesis aims to provide a contextual and a processual analysis (Pettigrew 1987, 1990a, 1990b) on disruptions as change. To do that it exploits the applicable knowledge of its author as gained through the practice of working with and

³² The interested reader should study, for example, grounded theory method by Glaser & Strauss (1967).

³³ Klein and Rowe define the profile requirements for professionally qualified doctoral students as follows: 1) A candidate should have 2-3 years' worth of real work experience, 2) advanced to a supervisory or other higher work role, 3) established a demonstrable record of accomplishment in their profession, and 4) achieved intellectual and emotional maturity borne of advanced work experience wherein they are able to interpret situations and solutions (2008, p. 677).

³⁴ In particular Klein and Rowe identify the qualitative action research or design science leveraging the working knowledge of professionally qualified doctoral students as examples where the value of applicative knowledge, for example, in terms of effective intuition and implicit learning processes, may provide them with certain advantages over other students (2008, p. 677).

within the researched focal companies and industries. This select longitudinal approach provides a good fit and a rich point of view for this analysis of change in a contextualist mode, and is well suited to complying with the above stated requirements concerning embeddedness, interconnectivity and causation.

5.2.2 Case research

Benbasat et al. (1987 p. 370) defines case research as follows:

“A case study examines a phenomenon in its natural setting, employing multiple methods of data collection to gather information from one or a few entities (people, groups, or organizations). The boundaries of the phenomenon are not clearly evident at the outset of the research and no experimental control or manipulation is used.”

Thus, it is a particularly well suited approach to the purposes of this thesis as it does not assume the researcher has much knowledge of what the interesting variables of study are and how these should, in the course of the research, be measured. Secondly, case research acknowledges the tradeoff between the advantage for a researcher to obtain firsthand information in its natural setting, and the consequent potential lack of objectivity due to the researcher’s involvement with the client organization (Benbasat et al 1987). As such, both the advantages and the handicaps associated with the approach can better be prepared for and managed throughout the course of research and, in the best case, the issues regarding research objectivity can be avoided.

Benbasat et al (1987, p. 373) describe multiple-case designs as being well suited to situations where the aim of the research is description, theory building or theory testing. Furthermore, they highlight multiple-case design “to allow for cross-case analysis and the extension of theory ... [and multiple-cases to] yield more general research results” (ibid., p. 373).

The unit of analysis for this thesis is the networks’ focal companies. These focal companies are studied in their own industries through distinct cases (see Figure 3). The scopes of the distinct cases, the composition of the focal companies’ business networks, market realities, technology standpoints and regulatory environment characteristics have all been different. It is nevertheless the intent of this thesis to, as an outcome, provide valuable generalizations pertaining to business model characteristics which can better withstand and exploit disruptions as opportunities.

The data sources for the research include the use of documentation, for example memorandums and reports collected from the case environments and publically available archival records, such as financial reports, semi-structured theme interviews and direct observations to absorb and note relevant factors from the field environment. The goal of the use of multiple data sources and specific data to represent different viewpoints – the internal and external views of a focal company, its business network and the industry operated in – is to establish a rich data source that encompasses the contextual complexity surrounding the specific research issue and research questions, while keeping the unit of analysis in mind (Benbasat et al 1987; Koskinen et al. 2005).

5.2.3 Principles utilized in interpretive field study

Klein and Myers (1999) have introduced seven dependent principles that are dependent on each other and which, when implemented within the framework of interpretive field studies should form an interdependent whole. In this thesis, these principles are applied to the research questions in the following manner (Figure 20).

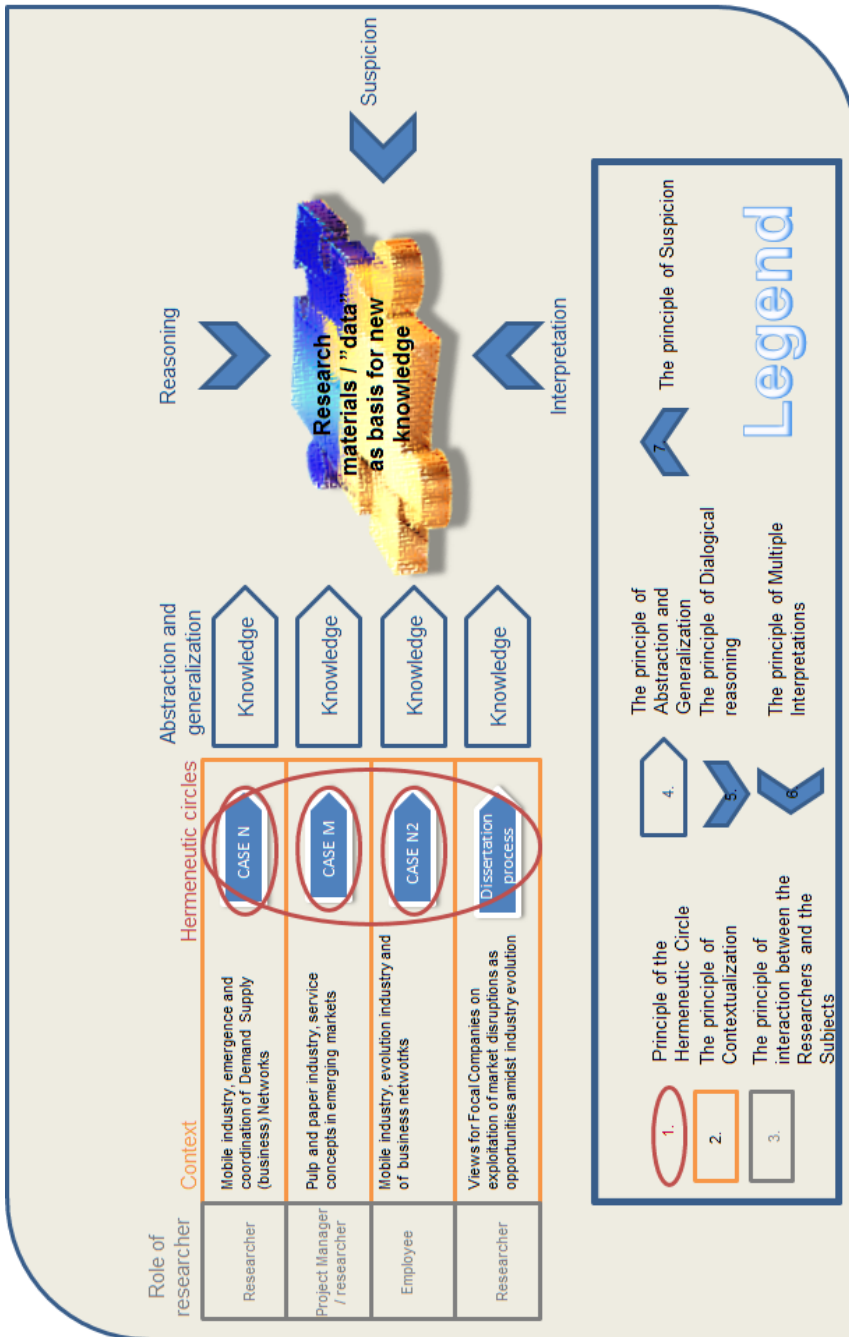


Figure 20 Use and relationship of the principles (Klein & Myers 1999) of this interpretive thesis

According to Klein & Myers, the principle of the hermeneutic circle “suggests that all human understanding is achieved by iterating between considering the interdependent meaning of parts and the whole that they form” (1999, p. 72). In this longitudinal study the empirical case studies, representing both theory and practice, are holistically considered to be composed of several hermeneutic cycles that independently, as distinct case studies, as well as cumulatively and in conjunction with the existing literature on the topic constitute towards accumulating knowledge for the purposes of this dissertation process.

The contextualization principle is “places the object of study in context” (Klein & Myers 1999, p. 74), which, in this thesis, is used in the interpretation of the identified hermeneutic cycles to find meaning in context. According to the requirements of the principle, the subject matter(s) are set and evaluated in their social and historical context in a manner that longitudinally provides the reader with an understanding of “how the current situation under investigation emerged” (Klein & Myers 1999, p. 73). This aim is satisfied in this thesis by providing the reader with longitudinal narratives into the histories of all the researched case industries and the investigated focal companies and the case studies within the researched timeframe.

To assess the role of the epistemological issues under the field of organizational sciences, Evered and Louis (1981) introduce two approaches for organizational inquiry; “inquiry from the outside” and “inquiry from the inside”. The main differences between these two is found in the role and manner in which the researcher is anchored in the context of the researched domain. In the “inquiry from inside” approach the researcher assumes the role of an active actor, much like in action research, contributing towards the chain of investigated events. Under the “inquiry from outside” approach, the researchers’ role is to remain as an outside observer purposefully taking on a neutral role over the investigated context so as to avoid influencing the research outcomes. Due to the fundamental differences associated with the positioning of the researcher in terms of the objective of the research, an inquiry from the inside tends to be based on situational observing leaning towards the boundaries of an industry or a company from within. External observation is often based on the established academic foundation (ibid.).

My personal role, responsibilities, and dependencies as a researcher regarding the studied phenomena, the involved industries, and the companies have significantly differed over the course of the researched timeframe. In and over the course of the distinct case studies as independent hermeneutic circles, my role and accountabilities have included the roles of a researcher, a project management for the university research project, and being an employee of a major indus-

try player. Due to these different standpoints and the motives associated with the distinct case studies, the nature of the empirical intervention has, in different cases, contained characteristics typically associated with the two methodological extremes of interventionist case research, and non-interventionist case research (Lukka 2005).

I have not in any of the case studies assumed the role of a non-interventionist neutral outsider. Rather, the objectives of the distinct case studies have, more or less, predetermined the research group's level of involvement, and the roles of the individual researchers within each context. However, it must be noted that in both Case Nokia and Case Metso the research group benefited from the image of objectivity, and neutrality that university involvement, as the facilitator of research, brought to the case studies. Being perceived as outsiders from the perspective of the corporations' everyday operative context, undoubtedly opened up many doors and resulted in many honest opinions and comments that otherwise would have been difficult to obtain. It furthermore enabled the research group to question the feasibility of certain decisions and to propose some ideas that perhaps could not have been proposed from within the companies themselves.

The principle of interaction between the researcher and the subjects requires "critical reflection on how the research materials (or 'data') were socially constructed through the interaction between the researchers and participants" (Klein & Myers 1999, p. 72). According to the principle, the participants of the study, whether being involved in it as interviewees, other researchers, employees, etc. are recognized as both interpreters and analysts of the phenomena (Klein & Myers 1999, p. 74).

My background has, unquestionably and without a doubt, had an impact on both the depth of and access to information utilized in this thesis because the sources of empirical evidence influenced the perspective and structuration of knowledge through the lenses provided by the principles of dialogical reasoning, multiple interpretations and suspicion. Therefore, according to the nature and requirements of interpretivism and the principle of interaction between the researcher and subjects, this thesis provides a longitudinal perspective in a manner that acknowledges the dependence between the researcher and the subjects, and recognizes its factual outcomes as being produced "as part and parcel of the social interaction of the researchers with the participants" (Klein & Myers, 1999, p. 74).

5.3 Introduction and reporting of case evidence

Next the distinct sources of empirical evidence for the thesis, here referred to as cases, are introduced in detail. Case N and Case M were distinct projects con-

ducted at the beginning of the millennia as a joint corporate research project between the University of Jyväskylä and the two focal companies, along with their selected focal partners/suppliers, who represent the focal companies' supply networks. The third case, Case N2, relates to the same industrial domain as Case N. However, this case significantly differs from the other two due to it representing a period of employment for the author within the mobile industry, and therefore serves as a source of longitudinal and applicative knowledge derived from practice (Heiskanen 1994; Heiskanen & Newman 1997). Furthermore, Case N2 differs from the two other cases by being a source of empirical information that has been accumulated without any single one research objective in mind at the time of inquiry (Klein & Rowe 2008).

As both of the corporate case research projects were conducted already some time back, the disclosure of the focal company names is according to the non-disclosure agreements signed at that time appropriate because there is no longer any need to protect the intellectual property or any other possible insider knowledge of the companies. Furthermore, both Nokia Corporation and Metso Paper have, within the past years, undergone major transitions and are not the same companies that they were at the time of the research-projects. For example, Nokia Corporation completed the sale of its former Devices and Services unit to Microsoft Corporation in 2014. Metso Paper was demerged from the Metso Corporation, and since the beginning of 2014 has operated independently under the name and brand of Valmet Corporation.

Due to ethical considerations and the writer being strict with maintaining trust, the identity of the partners and suppliers of the focal companies, along with the identity of all individual personnel contributing to the accumulation of empirical evidence, will remain undisclosed. To maintain scientific validity the distinct role and contribution of the various parties contributing to the cases is, to the best of my abilities, included as part of the case descriptions. In some instances, however, the exact contribution may not be appropriately traced back to the correct original source. Examples of such cases include, for example, instances where references are made to internal and/or undisclosed materials, project reports or meeting minutes. In addition, the contribution of various authors may not always be reflected in the best possible manner in cases where multiple parties have throughout the duration of the project contributed to the accumulation and presentation of information.

5.3.1 Case Nokia

Case N derives from a two-year research project “Information Technology in Business Relationships” that was executed between 2001 and 2003. The project was directed by the Telecom Business Research Center (TBRC) and executed in cooperation with the Department of Business Administration at Lappeenranta University of Technology (LUT). The other parties in the research consortia were the University of Jyväskylä (JYU - Department of Computer Science and Information Systems), University of Turku (UTU), and Timo Kivisto Consulting Oy (TKC).

The introduction of Case N is based on the content of an unpublished project report by Heli Huhtinen (LUT), Jukka Heikkilä (JYU), Timo Kivistö (TKC), Pekka Reijonen (UTU), Eija Tella (LUT), Hannu Vahtera (JYU), & Veli-Matti Virolainen (LUT). This is also the group of people that formed the core project group. Heli Huhtinen was the editor of the report, and is therefore acknowledged as the main contributor to this chapter.

Information Technology in Business Relationships project had two focal companies in its scope. The project investigated the supply chains of two global companies operating in the Finnish telecommunications sector. These two focal companies are Nokia Corporation (referred to hereafter as Buyer B), and Sonera (referred hereafter as Buyer A).

The objectives, research approach, as well as the supplier scope of the study varied between the two case companies: Buyer A and Buyer B. Buyer A’s interests in the research project concentrated mainly on matters pertaining to issues relevant to (organizing its) strategic purchasing. Buyer B was interested in finding solutions, or rather the correct questions, for issues pertaining to the implementation of its, at the time, new collaborative Product Data Management (cPDM) concept with a set of selected suppliers. The purpose of this cPDM, at a conceptual level, was to create a collaborative Product Data Management (PDM) environment to support the exchange of the product and commercial data³⁵ needed for the execution of Buyer B’s delivery process (Huhtinen et al. 2003, p. 54). What this concept was expected to yield after implementation was described as

³⁵ Examples of product and commercial data containing, for example, product content in the form of Bill-of-Material, engineering change need related information, sourcing and management related data as well as component and module price information and volume allocations between suppliers (Huhtinen et al. 2003, p. 54).

“a synchronized extended enterprise:³⁶ Accurate information sharing” (ibid., p. 54).

Figure 21 illustrates the structure of, and the focal company’s role in, the researched business networks. Buyer B’s supply chain is emphasized due to being the supply chain focused on in this doctoral dissertation.

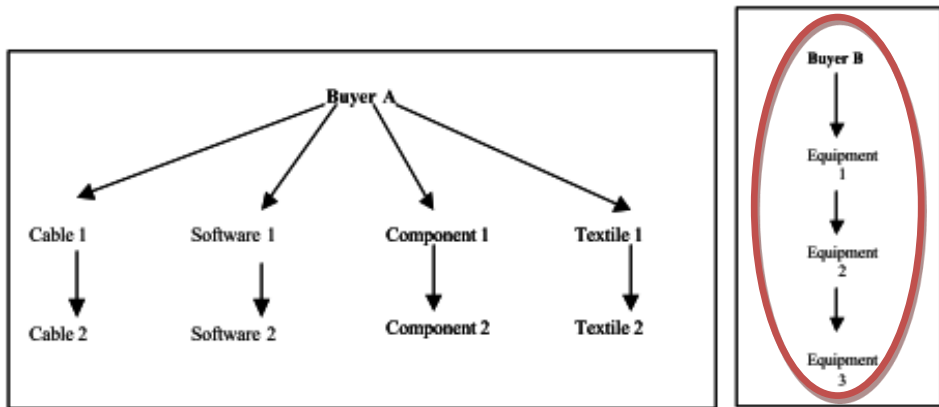


Figure 21 Structure of the investigated networks in the scope of Case N (Modified from Huhtinen et al. 2003)

Buyer A’s supplier-network composed of eight suppliers, half of the suppliers representing first-tier and the other half second-tier suppliers. All of Buyer A’s distinct supply chains in the scope of the study were chosen so that they represented different industries. Buyer B’s case network consisted of three suppliers, each representing a different tier in the supply chain. In both case networks, the naming of the suppliers provides the reader with a general idea of the field in which the supplier operates and identifies the tier in the supply chain that the supplier belongs to.

At the time of our research project Buyer A was defined as a large company that operated in mobile communications, operating several different functions in several countries. As such, Buyer A was accurately described as a communica-

³⁶ Spekman & Davis (2004, p. 415) describe the concept of extended enterprise in a way that complements the earlier definition by Dyer (2000): “The notion of the extended enterprise takes supply chain management (SCM) to the next level and focuses on those factors and characteristics that link supply chain members by far more than just workflow and logistics. The extended enterprise captures the idea that firms are also linked as learning organizations. Knowledge becomes the currency of exchange, and the goal is to create value for customers such that each supply chain member benefits.”

tion company that belonged to one of the key industries of the ICT cluster. Buyer A's case network consists of:

- Cable 1: large size company manufacturing cable for the network industry. Representing the first tier in Buyer A's supply chain
- Cable 2: large Size Company distributing raw materials to cable manufacturers. Representing second tier in Buyer A's supply chain
- Software 1: large company developing software used for invoicing and the management of the telecommunication networks. First tier supplier for Buyer A.
- Software 2: internal division of "Software 1". Second tier supplier for Buyer A
- Component 1: SME size component supplier for communications networks. First tier supplier for Buyer A
- Component 2: SME size component supplier for communications networks. Second tier supplier for Buyer A
- Textile 1: contract manufacturer of textiles for the builders of telecommunication networks. SME-size. First tier for Buyer A
- Textile 2: produces raw materials for "Textile 1". SME-size. Second tier supplier for Buyer A

At the time of our research project, Buyer B was a large company headquartered in Finland and operating in the mobile industry. The company had operations in many countries worldwide and had organized its operation into distinct business divisions. Each of its business divisions carried profit and loss accountability for the delivery of their distinct product and service offering to their markets. These business divisions of Buyer B will, in this thesis, be referred to only as Business Unit 1 and Business Unit 2. In addition, Buyer B had organized the function responsible for its corporate Business Infrastructure and IT as a separate unit. This unit will, where necessary, be referred to as 'Corporate Functions'.

Business Unit 1 is engaged in the mass-manufacturing and delivery of consumer electronics globally. Business Unit 1 both manufactures and provides services for its customers due to its global physical presence, manufacturing facilities and supply-base, covering Asia Pacific, North and South America and Europe, the Middle East and Africa. On top of its regional manufacturing, Business Unit 1 has sales operations areas clustered around the globe in a manner that enables it to have a sales presence in, or close, to markets it operates in. Business Unit 1 has access to and, at times, uses Contract Electronic Manufacturers (CEM) to balance its own production.

Business Unit 2 is engaged in the project-based manufacturing of infrastructure solutions and services. Business Unit 2 operates globally and uses both its own manufacturing capacity as well as CEMs for the production of its goods.

The corporate Functions of Buyer B are responsible for the availability and management of Information and Communications Technology infrastructure and IT applications used both internally as well as externally. Buyer B used a lot of internally created IT solutions for the execution of its business processes, and the development and support for these applications was also under the responsibility of Corporate Functions. The presence of Corporate Functions was also arranged globally, so that service management, including application support, was available at all of the manufacturing sites.

Buyer B's case network consists of three suppliers, and each company forms a separate tier in Buyer B's supply chain. Buyer B's supply chain was selected to represent only the viewpoint of a focal company's business division providing mobile, broadband and IP network infrastructure and related services to its customers. These suppliers can be presented in the following way:

- Equipment 1: first tier supplier in the Buyer B's supply chain. SME assembling components required for the building of communications networks
- Equipment 2: second tier supplier in Buyer B's supply chain. SME size telecommunications network component manufacturer
- Equipment 3: third tier supplier in Buyer B's supply chain. Large size telecommunications network component manufacturer

Buyer B had established an internal project group for the purposes of cPDM implementation in the supplier interface. Our research consortia did not have a formal role or accountabilities in this implementation project. Instead, our research consortia contributed by working to realize our own research objectives and schedule. The interaction between the research consortia and internal implementation project of Buyer B took place when some of the people involved in the latter were interviewed as part of our research. Our research project sponsor also had a role in the implementation project and facilitated the informal exchange of information between us and the internal project.

Figure 22 illustrates the project's research framework and research focus areas, and highlights those focus areas within the scope of this thesis.

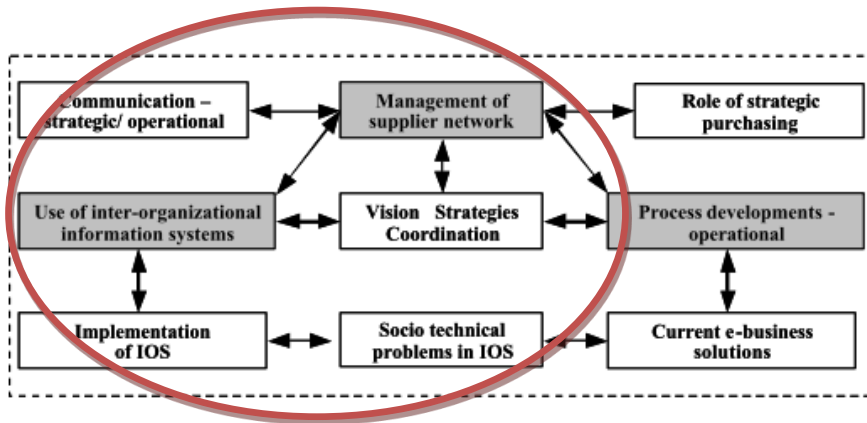


Figure 22 Research framework and its focus areas (from Huhtinen et al. 2003)

The study of Buyer A's research objectives was based more on the theoretical considerations than on the empirical findings. As a result, most of the empirical evidence, including research methods and data collection throughout the project, mainly focused on the fulfillment of Buyer B objectives. To maintain academic integrity and the relevance of sampling, most of the empirical case evidence based on Case N and used in this thesis will be limited to the research domain and objectives of Buyer B, with the exceptions being specifically mentioned (Orlikowski 1993).

At the beginning of the project, Buyer B represented just one business unit of a global company operating in the mobile industry and was – together with its selected suppliers – considered as the other of the two focal companies in the project's scope. From the beginning of 2002, Buyer B's scope was expanded to cover an additional Business Unit due to a request by Buyer B's representatives in our research project's Steering Group.

The significance of this change in the scope meant that, whereas originally Buyer B represented a manufacturer and provider of telecommunications related infrastructure solutions and services for our research consortia, the other business unit was engaged in the mass-production and delivery of consumer electronics. As the two business units represented two very different types of business and operational maturity, we – as the research consortia – were primarily given an opportunity to widen our research focus, but also faced a need to review and re-tune our research approach accordingly. As a result of the expansion of our scope concerning Buyer B, the amount of interviews and the number of interviewed companies (suppliers) conducted as part of the research project increased.

In cooperation with the focal company's representatives' objectives, the research objectives for Buyer B were defined as depicted in Table 9.

Table 9 Buyer B research objectives for the Information Technology in Business Relationships project (from Huhtinen et al. 2003)

BUYER B OBJECTIVES
Investigate and increase understanding on factors relevant for combining concepts of supply chain management (SCM) and PDM
Create a comprehensive view of the current PDM context and its connection with business-to-business collaboration
Understand the prevailing business environment and potential and perceived capabilities of companies in terms of PDM

During 2001, the research was focused on inter-company cooperation and the emphasis was on the study of supply chains and networks illustrated earlier in Figure 21. In 2002, the project group emphasized the analysis of the internal operations and the company-specific challenges of the companies. The data gathering methods for the empirical part of the project included interviews, a web-based survey questionnaire conducted by our research consortia to chart out the current state of the companies' capabilities and their perceptions of the use of IT for collaborative purposes, workshop documentation, and information acquired from separate meetings with the representatives of the case companies in the project steering group meetings.

A web-based survey questionnaire was conducted in 2001. Eventually 50% of the 168 survey invites sent were accepted and included in our survey sample. The survey responses included representation from both of the focal companies (Buyer A and Buyer B) and their selected network participants. As such, it is not possible to pinpoint the survey responses as pertaining to either Buyer A or Buyer B, but as representative of a wider sample within the context area of our research project.

Altogether we received 96 responses to the 168 survey invites sent to the personnel representing both of our case organizations and their selected suppliers, representing various tiers within the focal companies' supply network. After the survey responses were analyzed and, for example, duplicate answers removed, 84 responses were accepted for the survey sample. Table 10 clarifies the data collection methods employed during the project.

Table 10 Data collection methods employed during the research (from Huhtinen et al. 2003)

	2001												2002												2003			Total
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
Current state interviews					6	11																						17
Current state survey																												84
Project meetings		2		1	1			2					1	1	1					1		1		1			12	
Other company meetings		1	1											1		1	2	1									7	
Company workshops						1				1	1											1					4	
Project workshops				1														1		1		1					4	
Further interviews													1	1		2	3	2	9	13	9	2		1			43	

The column labeled ‘total’ illustrates the number of events organized and attended by the project team members during the two-year time span. In the same column the number 84 refers to the sample size and the amount of responses accepted by the survey. The interviews consisted of six interviews at the focal companies and 11 interviews with their suppliers. The total amount of interviews related to the research objectives of Buyer B were: 28 focal company interviews (including 33 interviewees) and 4 supplier interviews (including 9 interviewees). All of the interviews were conducted between June and October of 2002.

Project meetings include meetings and discussions held within the case companies. Other company meetings include benchmarking studies, cross-company steering groups and meetings with companies other than the case companies. The workshops have been divided into company and project workshops depending on the participants represented at each event.

The different emphasis of the two case companies required different research approaches from our research consortia. While Buyer A’s research objectives were more theoretical and could be easily approached via the viewpoint of literature and earlier research made on the area, Buyer B’s research objectives were very novel and pragmatic. Due to the lack of an available existing theory-base and in the absence of prior research suiting our purposes, additional information needed to be collected directly from the field. In other words, from the different parties involved in or contributing towards Buyer B’s definition of collaborative PDM. For this purpose, the research consortia chose semi-structured interviews as the tool for the data gathering.

Table 11 provides a more comprehensive categorization of the Buyer B semi-structured interviews.

Table 11 Categorization of the Buyer B-related company internal and supplier interviews (modified from Huhtinen et al. 2003)

Organizational level / function	Business Unit 1 - manufacturing and delivery of consumer electronics	Business Unit 2 - manufacturing of infrastructure solutions and services	Corporate function -Business Infrastructure and IT	Total (number of people interviewed)
Buyer B	Number of people interviewed			
Management	2	4	-	6
Sourcing	6	8	-	14
Information Systems	1	-	4	5
Supplier Interface	1	6	1	8
Total by unit/ function	10	18	5	33
Suppliers of Buyer B	9 (altogether 4 supplier interviews: 3/3/2/1)			42

Table 11 highlights the total amount of people interviewed in terms of their function within Buyer B or as representatives of its supplier interface. Altogether, we interviewed 33 representatives from Buyer B. We also interviewed 9 representatives of its suppliers in four supplier interviews. Two of these suppliers were selected based on their participation in an ongoing pilot project that aimed to implement the cPDM. The other two suppliers were later selected and interviewed based on the findings of our earlier interviews.

The initial selection of the interviewees was performed together with our project sponsor. This project sponsor was operatively working in and for Business Unit 2, but who nevertheless – for the research consortia – represented the whole of Buyer B. After the initial interviews, more interviewees were gradually added to our research framework and scope to gain more understanding and a wider perspective on the research phenomena. Due to the expansion of our research scope it became necessary to widen our perspectives and conduct more interviews that covered the expanded requirements of Business Unit 1.

The interviews were conducted so that a rough list of questions to be answered during the meetings could be used to form the structure of the meeting, thus facilitating the discussion topics. Depending on the interview, and its evaluated significance for the research, the interviewer exercised the liberty to direct the discussion and emphasize topics considered worthwhile pursuing with additional questions. The length of each interview was about 1.5 hours, but depending on the fruitfulness of the session, the timing was kept flexible.

To prepare for the interview beforehand, the interviewee was provided with information on the project and the structure of the interview via e-mail. All the interviews were conducted face-to-face at Buyer B or on its suppliers' premises, except for three telephone interviews. All of the interviews were documented by recording the discussion on minidisks and later transcribing them, or by the inter-

viewer taking notes during the interview. The validity of the interview documentation was ensured by the interviewees being requested to review and sign the collected interview documentation.

Despite the extensive amount of interviews conducted, there was no possibility to discuss the issues with all the people who might have had relevant information that could have widened our understanding of the phenomena. The business units also differed significantly and, for example, understood and used some of the PDM-related terms differently. Altogether these shortcomings raise some doubt about the level of generalization our findings allow outside of the boundaries of the investigated phenomena.

In most cases I will cite our project report (Huhtinen et al. 2003) when referring to the overall findings of Case N's research project. To elaborate on certain points and to provide insight into some matters I, however, use selected quotes from our interviews. On all occasions the interviewees' identity will remain anonymous. This is to respect interviewees' anonymity and to honor the agreements concerning confidentiality that our research consortia made with Buyer B and its network partners. To provide the reader with the necessary background information concerning the quotes and statements used to highlight, for example, roles and functions from the viewpoint of the interviewee, I have used the following codification illustrated in Table 12, which provides a partial representation of the interviews conducted as part of Case N. The aim of the table is to provide the reader with an academically necessary audit trail between the research project and the specific interviews that are referred to within the thesis.

Table 12 Case N interviewees list

Interview code / Business Unit of persons interviewed	Interviewer	Date	Interviewees function
11/BU1	Heli Huhtinen; Timo Kivistö	19.8.2002	(Executive) management & strategy, Sourcing and Procurement
12/BU1	Jukka Heikkilä; Miika Sunikka	2.7.2002	(Executive) management & strategy, Sourcing and Procurement
13/BU1	Miika Sunikka; Pekka Reijonen	7.8.2002	Executive management & strategy, Sourcing and Procurement
14/BU2	Heli Huhtinen; Timo Kivistö	23.8.2002	Management and strategy, Sourcing
21/BU1	Miika Sunikka; Pekka Reijonen	5.9.2002	Management, outsourcing
22/BU1	Eija Tella; Miika Sunikka	22.8.2002	Partner Management
23/BU1	Hannu Vahtera; Miika Sunikka	26.8.2002	Partner Management
24/BU2	Hannu Vahtera; Miika Sunikka	10.7.2002	Supplier Management
25/BU2	Miika Sunikka	9.8.2002	Management, pre-production
26/BU2	Eija Tella; Heli Huhtinen	26.8.2002	Management, Documentation and Controlling
27/BU2	Hannu Vahtera; Miika Sunikka	1.7.2002	Partner Management
28/BU2	Eija Tella; Heli Huhtinen	26.8.2002	Management, Documentation and Controlling
31/BU1	Heli Huhtinen; Miika Sunikka	13.8.2002	Specialist, Documentation and Controlling
32/BU2	Miika Sunikka; Timo Kivistö	4.7.2002	Specialist, Documentation and Controlling
33/BU2	Miika Sunikka	9.8.2002	Specialist, sourcing
34/BU2	Hannu Vahtera; Miika Sunikka; Timo Kivistö	1.7.2002	Specialist, planning and forecasting

5.3.2 Case N2

Researchers operating interpretively within their study context assume knowledge to be accumulated by human experience and be experientially validated (Evered & Louis 1981). Therefore, a researcher must often immerse him or herself in the collection of tacit knowledge specific to the subject of the study (Orlikowski & Baroudi 1991; Klein & Myers 1999) and may not necessarily utilize any predefined, formal, scientific method for the inquiry (Evered & Louis 1981). This emphasizes the need for a researcher that also operates as an actor within the subject area to both contribute and perform according to the boundaries of the domain, such as in an organization, but also to be able to identify relevant and meaningful events as findings. The context-specificity of the research therefore implies that the research finding may also, to a certain extent, be understood as case specific and that the validity of the research findings, despite situational relevance, require a systematic approach in order to be generalized to the level of praxis.

An outside observer bases his/her evaluation on a predefined conceptualization pertaining to the research environment and context as law-like, structured, facts (Evered & Louis, 1981, p. 388). Therefore, the research findings are identi-

fied as based on monitored deviations between the expected and the actual. Due to the use of a predefined research frame guiding the data gathering, the validity of the research findings may, on theory level, be perceived as scientifically more generalizable, or valid, whereas this does not pertain to the applicability of the same findings in the practical context. Instead, scientific findings (outside-in) may lack the needed levels of domain specificity in a real-life context.

Pettigrew compares the type of research intending to capture and understand change as being about “catching reality in flight” (1990a, p. 268). He further argues that research that studies change as the unit of analysis is “theoretically sound and practically useful” and requires that a focus be put on the “studying of long-term processes in their context, a return to embeddedness as a principal of method” (ibid., p. 268).

Since 2003 I have worked in the mobile telecommunications industry. Until 2014 my employer was Nokia Corporation, followed by Microsoft Mobile Oy after the completion of the sale of the Nokia Devices and Services unit. Throughout my employment period I have had the privilege to work with some of the most talented and motivated people one can hope for and witness, as well as been a part of, the evolution of the mobile industry. Within this period of employment in the industry I have worked in multiple positions and participated in numerous development initiatives.

All of the projects I have been involved in while employed in the industry have had to do with the development of supply chain capabilities, usually with the aim of implementing various performance improvements. As such, my inside-out view of network collaboration has – without disruption – continued throughout my whole employment period and throughout the research timeframe covered in this thesis.

The research approach Case N2 correlates to that of the Reflective Information Systems Practitioner approach (RISP) (Heiskanen 1994; Heiskanen & Newman 1997; Heiskanen et al. 2008). As a research approach, RISP bears resemblance to ethnographic research and action research, but differs from those because it emphasizes the active role of the researcher as both a purposefully intervening academic and as a practitioner (Heiskanen et al. 2008, p. 274).

My employment with Nokia has both provided me with access to confidential information and it has constituted most of the direct empirical evidence, which derives from corporate projects and which was gathered during a period when it was confidential. While such material may not be published as such, they have for me – as the author of this thesis – resulted in the accumulation of a vast amount of applicable knowledge. This knowledge, I believe, will enable the combining of educational learning experiences with operative insights in a manner that “yield[s] practical wisdom and comprehensive know-how” (Klein & Rowe 2008, p. 678).

Due to my chosen longitudinal research approach and interest in the particular area of inquiry, I have kept field notes and meeting minutes that document interesting observations, quotes and knowledge I gained. These notes along with recollections of situational conditions, discussions and operative priorities of that time will be used as the primary source of information for the empirical evidence from Case N2.

5.3.3 *Case Metso*

In the early 21st century, the economic development of China, together with the country joining the World Trade Organization (WTO) in late 2001, offered attractive business opportunities. Case M was a pre-study project executed between May and October of 2002, with the aim to chart potential areas in which ICT support could improve the productivity of a paper mill, especially in the Chinese market. The timespan of the pre-study was set to cover the next seven years, in other words it covered 2002-2009. In the research, special attention was paid to the customer-based measures of productivity and the boundary objects. That was done with respect to information exchange during the different stages of the paper machine and factory's lifespan.

The research consortia was composed of members representing academia (University of Jyväskylä), industry (the focal company along with five of its selected partners) and a regional development company. The University of Jyväskylä, Department of Computer Science and Information Technology acted as the facilitator of the research consortia. The pre-study delivered an unpublished evaluation on the potential for ICT to improve focal company operations and paper mill productivity in China, and outlined future research streams, which were later realized in the subsequent corporate project conducted by the consortia members.

The main research method for information gathering was 22 semi-structured theme interviews conducted at the two business units of our pre-study focal company. For the interviews a separate framework was used to identify the roles in which the interviewees expressed their views on the focal company and its subcontractors' present and future operations, and ICT in the China markets. The project group also made a literature analysis to find applicable information on the Asian paper market and on our focal company – the material was gathered from authorities, industrial journals, scientific articles and studies, books and the Internet. In particular, the theoretical perspective of the study was mainly gathered and constructed from the available literature. During the project, one workshop

was held to offer the project's representatives a chance to guide and comment on the progress and findings of the research.

The empirical evidence used in this thesis and concerning Case M is largely based on the works of a dedicated core project team that executed the research, interviews and reported the findings in an undisclosed pre-study report (Heikkilä, Heikkilä, Rahja & Vahtera 2002). The core team members, who are acknowledged for their contribution to the pre-study, and their specific roles in the initiative, are listed below.

- Professor Jukka Heikkilä, director, responsible for the pre-study within JYU
- Hannu Vahtera, project manager, focused on networked business models and socio-technical factors affecting collaboration
- Marikka Heikkilä, project researcher, focused on the ICT supported communications and the coordination of joint operations
- Jani Rahja, project researcher, focused on the evaluation of China as a market area

The interviewees were selected to cover as many phases of the products' and customers' lifecycles as possible. Hence, the interviewees are key informants, with a comprehensive overview of the research area within the evaluated timeframe. The original set of interviewees was selected by the project core group, but the blind spots in the framework, which were realized later on, were completed on the basis of information about potential key informants, which was obtained during the interviews. The objective was to interview approximately 20 focal company employees – 22 were interviewed. The interviews were conducted between June and September 2002. The interviewees' workplace locations included several locations within Finland, China, Singapore and Thailand. The interviewees decided to remain anonymous. To enable the feasible grouping and analysis of the data, the interviewees were coded so that the interviewee's position in the product lifecycle can be determined by the code number assigned to each interview. Table 13 summarizes the interviews.

Table 13 Case M interviewees list (from Heikkilä, Rahja & Vahtera 2002)

Interviewee code	Interviewer	Date	Interviewees function
11	Marikka Heikkilä	5.7.2002	Research and Development
12	Marikka Heikkilä	1.7.2002	Research and Development
21	Marikka Heikkilä	27.6.2002	Negotiations & Sales
22	Marikka Heikkilä	3.9.2002	Negotiations & Sales
31	Jani Rahja	6.6.2002	Projects & References
32	Marikka Heikkilä	12.6.2002	Projects & References
33	Marikka Heikkilä	5.6.2002	Projects & References
34	Jani Rahja	21.8.2002	Projects & References
35	Jani Rahja	22.8.2002	Projects & References
36	Jani Rahja	15.8.2002	Projects & References
37	Jukka Heikkilä, Jani Rahja	26.9.2002	Projects & References
41	Jani Rahja	11.6.2002	Care & Maintenance
42	Jani Rahja	18.6.2002	Care & Maintenance
43	Jani Rahja	20.6.2002	Care & Maintenance
44	Marikka Heikkilä	31.7.2002	Care & Maintenance
45	Marikka Heikkilä, Jani Rahja Jukka Heikkilä, Hannu Vahtera	28.5.2002	Care & Maintenance
46	Jani Rahja	5.7.2002	Care & Maintenance
47	Jani Rahja	18.6.2002	Care & Maintenance
51	Jani Rahja	7.6.2002	Other
52	Marikka Heikkilä	5.7.2002	Other
53	Jani Rahja	14.6.2002	Other
54	Jani Rahja	10.6.2002	Other

6 LONGITUDINAL CONTEXTUAL ANALYSIS ON THE IMPACT OF DISRUPTIONS ON THE BUSINESS MODELS OF THE TWO FOCAL COMPANIES

This chapter puts the findings of this thesis into their real-life context. It aims to approach the first research questions of this doctoral dissertation by considering the importance of shared strategy in the creation and longer-term sustainability of the collaborative business network. In this chapter a longitudinal contextual analysis is conducted on the two focal companies, Metso (Pulp and Paper segment) and Nokia (the Devices business unit) to illustrate the type, nature, and effect of the disruptions in their industry context. The chapter is, for clarity, structured as two separate case analyses presented one after another. Both analyses are constructed similarly and contain a brief introduction of the industry level changes from the focal company's viewpoint, followed by a discussion of the disruptions. Each section ends with a brief summary of the results of the analysis.

6.1 Method and limitations of the analysis

The method for the longitudinal contextual analysis performed in this chapter follows the guidelines of Pettigrew (1987, 1990a, 1990b), highlighting the dependency of past, present and future time on the conceptualization of reality and identifying continuities within context.

“Time itself sets a frame of reference for what changes are seen and how those changes are explained. The more we look at present-day events the easier it is to identify change and see the visible hand of leadership. The longer we stay with an emergent process and the further back we go to disentangle its origins, the more we identify continuities. Empirically and theoretically, change and continuity need one another. Action and structure are inextricably linked.” (Pettigrew 1987, p. 649)

The aim of the contextual longitudinal analysis of this chapter is to collect the relevant information that was made publically available over the researched timeframe in order to identify relevant disruptions, the drivers of disruptive events, and the strategic actions that either affected or were used by the focal companies.

In the following analysis, the empirical evidence from the distinct case research projects are used where necessary. These distinct cases (separate research projects) are used as independent hermeneutic cycles (Klein & Myers 1999), providing insight and empirical knowledge for the inquiry into the structural change of the industries, and on the actions of the focal companies. For the purposes of the analysis this empirical evidence is utilized according to the principles of interpretation, and reasoning (Klein & Myers 1999). The reasoning behind the use of the empirical case evidence – as part of the longitudinal contextual analyses – lies in its ability to explain, describe, illustrate and explore the role and consequences of some of the identified disruptions, and the consequent need for the construction of novel collaborative business models. Figure 23 summarizes the overall method of longitudinal contextual analysis applied in this chapter.

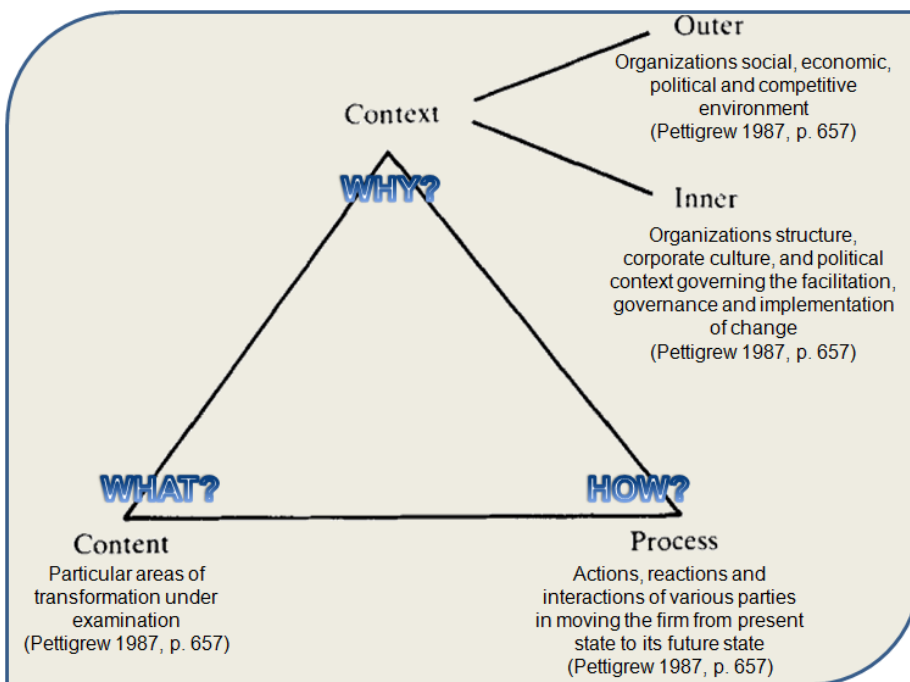


Figure 23 Method of longitudinal contextual analysis (modified from Pettigrew 1987, p. 657)

According to the above framework illustrated in Figure 23, the context refers to those disruptions, disruptive changes and events that lead the investigated focal companies to take (planned or unplanned) strategic actions, which are described in the figure as processes that the focal companies undergo as a cause or in response to disruptions, and which move the company “from its present state to its future state” (Pettigrew 1987, p. 657). More specifically, the outer context refers to the organization’s external domain, for example changes in the focal company’s industries and markets as a result of competitor actions or overall changes in the maturity of the focal company’s field of operation. The inner context refers to the organization’s internal domain, for example, that pertaining to the structure and culture of the focal company. These analyses yield a categorization of some of the disruptions that were shown to be relevant for the sustainability and operability of the investigated focal companies’ and for their collaborative business models.

Empirical evidence from Case N, Case M and Case N2 are for the purposes of the analysis utilized to provide insight and to guide in the identification of the necessary aspects for detailed investigation. Referring to above Figure 23, in terms of content this empirical evidence contributes to the understanding needed to determine *what* to investigate on, and to further focus and pinpoint the inquiry on the correct topics. For the inquiry on the context and processes this same empirical evidence complements the other publicly available information with an inside-out view to describe and better understand investigated companies’ inner contextual premises and processes (Pettigrew 1987).

Disruptions are, for the purposes of the analysis, considered as drivers that force business models to change throughout a company’s lifecycle. Furthermore, disruptions identified through analysis are categorized under one of the following three categories; 1) technology disruptions, 2) market disruptions, or 3) regulatory disruptions (Bouwman et al. 2009). The source, type, and nature of information available and used in the following longitudinal contextual analysis of the two focal companies must be highlighted as a limitation pertaining to these analyses. Information, such as that published in their annual reports, represents the recollections of a company’s past but it is regulated by legislation. The inherent nature and objective of a company is to yield value for their current shareholders and to attract new ones. That objective is reflected in the manner in which the company discloses information pertaining to its financial statements, future outlook and strategy.

It is mandatory to note that the publicly disclosed elements of a company’s strategy may not fully or temporally reflect the views of the company’s major shareholders or its executive management. Depending on competitive reasons,

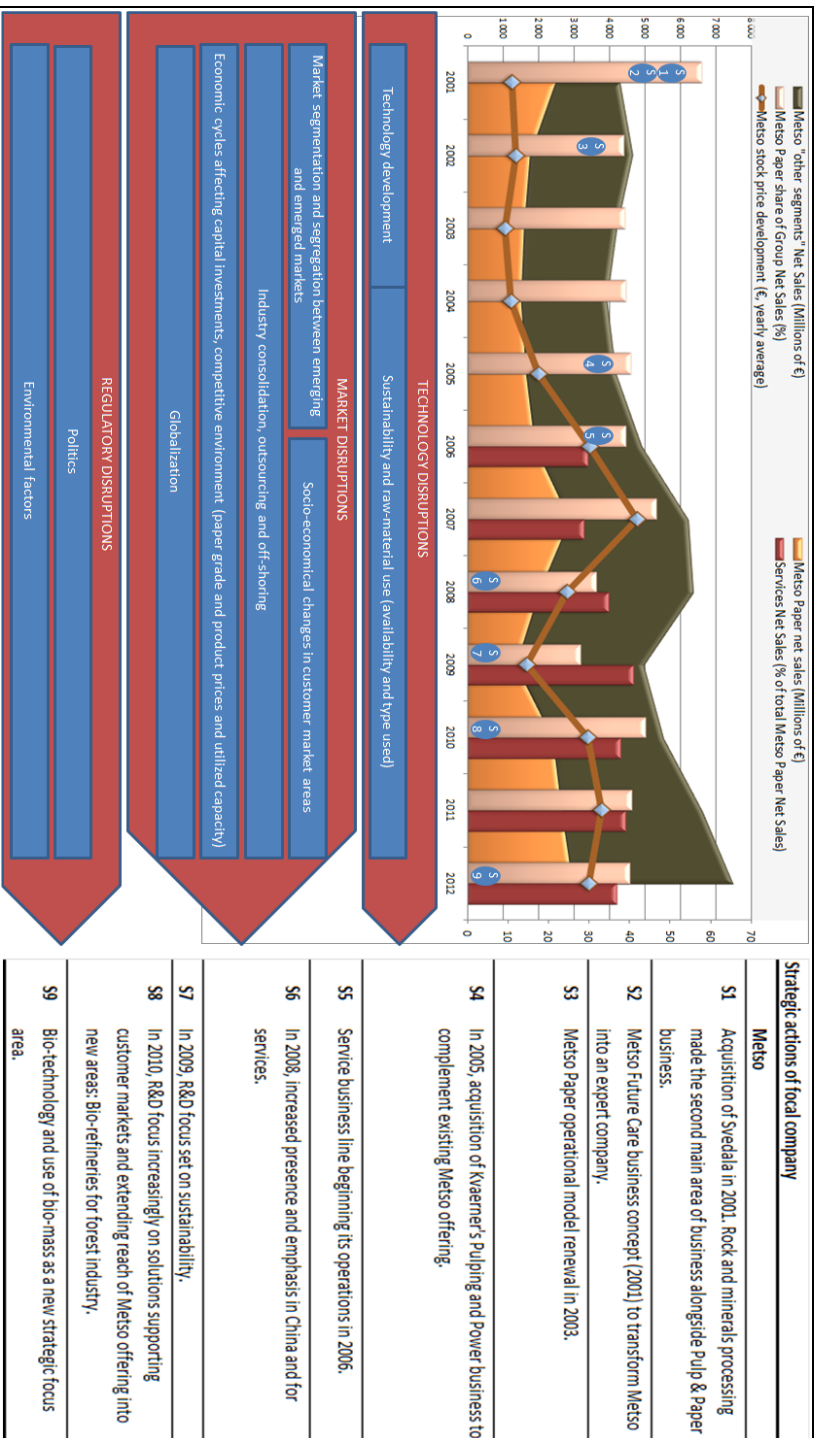
such as industry and market environment stability or legislative reasons, a company may not be willing or able to disclose all of the information it holds at the time of fiscal reporting. All public information released by the companies themselves should, at best, be considered to represent their current planned strategy and intentions, as written by the professional community of their communications departments. However, the actual execution and the operative priorities of companies may significantly differ from their publicly disclosed and planned strategies (Mintzberg 1978).

6.2 Analysis I: Metso Paper

6.2.1 Occurrence and effect of disruptions on Metso Paper

Figure 24 along with the subsequent analysis builds on the earlier discussion in this thesis. The case example is created from the focal company viewpoint of Metso Paper as a global supplier of technology and services in the pulp and paper industry. The external and internal viewpoints highlighted in the figure are presented and considered from the focal company perspective. Information used in the figure is collected from annual reports (Annual report, form 20-F), and from the other publicly available information on the webpages of Metso Corporation³⁷. Elements embedded in the graph are presented in more detail below.

³⁷ Metso Corporation financial reports (annual reports (form 20-F)). Available: http://www.metso.com/corporation/ir_eng.nsf/WebWID/WTB-041108-2256F-4F806?OpenDocument&mid=A0E96500A79455E2C22575AE004EE62C



Strategic actions of focal company

Metso

- S1** Acquisition of Svedala in 2001. Rock and minerals processing made the second main area of business alongside Pulp & Paper business.
- S2** Metso Future Care business concept (2001) to transform Metso into an expert company.
- S3** Metso Paper operational model renewal in 2003.
- S4** In 2005, acquisition of Kvaerner's pulping and Power business to complement existing Metso offering.
- S5** Service business line beginning its operations in 2006.
- S6** In 2008, increased presence and emphasis in China and for services.
- S7** In 2009, R&D focus set on sustainability.
- S8** In 2010, R&D focus increasingly on solutions supporting customer markets and extending reach of Metso offering into new areas. Bio-refineries for forest industry.
- S9** Bio-technology and use of bio-mass as a new strategic focus area.

Figure 24 Contextual longitudinal analysis of Metso Paper.

Metso Corporation's market share information alone does not add value to the purposes of this thesis. Therefore, the graph displays changes in Metso Paper net sales in both millions of euros and as a percentage of the overall Metso Group net sales over the researched timeframe. To further highlight the impact of the structural change in the pulp and paper industry, the growth of Metso's service net sales is presented as percentage of Metso Paper's total net sales.

Metso's stock price development is based on the calculated yearly stock price average (calculated average of the daily closing values for the year in question). The value and use of stock price information as part of the illustration is solely for indicative purposes – to represent perceived market value development and yearly appreciation within the timeframe. This is due to the nature of the company share value being highly speculative and containing the viewpoints of other Metso segments not included in the scope of the analysis of this thesis, for example Metso Automation and Metso Mining and Construction.

To describe the structural change of the pulp and paper industry for the categorization of the disruptions, empirical evidence from Case M is used. Data collection methods for the empirical evidence from this case research project are based on the earlier observation of the focal company and its service providers, as well as on the semi-structured theme interviews we conducted within the focal company at the time of the pre-study project. The case and its data collection methods are described in detail in Chapter 5.3.3.

Disruptions are grouped according to their classification as technology-, market- or regulatory disruptions and are presented as bars below the graph. The placement and size of the bars aims to highlight the order and time of disruptions. Conceptualization, sequence and the timing of disruptions in the graph are naturally somewhat speculative. To paint the picture in the best way possible, I have used the company annual reports, along with other available information pertaining to the matters discussed, and identified the most relevant disruptions and placed them in chronological order in the graph. The strategic actions of the focal company, labeled S1-S9 are also placed on the graph. The strategic actions are, in a similar manner to the disruptions, selected due to their significance for the industry, focal company strategy, and for the intercompany collaboration of the focal company with its network partners. The timings of these strategic actions are based on the information available in Metso's annual reports and are introduced in necessary detail below.

6.2.2 Pulp and paper industry disruptions driving changes in Metso Paper

The competitive advantage of Metso Paper was, for a long time, based on the company's expertise and knowledge in building and delivering large, high-

volume, paper machines. In 2002 Metso was the world's largest paper and board machine manufacturer, supplying 30-35% of paper machine markets globally and it held approximately a 40% share of the large paper machine market (Heikkilä et al. 2002).

In the pulp and paper industry context the development of technology has, throughout the 21st century, created improved possibilities for enhancing the use and production volumes of paper machines for a variety of raw materials and paper grades. This development has also altered the competitive environment dramatically by lowering the entry barrier for new competition, and adding to the over capacity of paper globally (Metso annual report 2005). Price competition has, especially in the segment of small- and medium-sized paper machines, intensified and overall constituted towards a lower demand for large paper machines. As such, the commoditization of technology and the subsequent increase in the competition at the beginning of the 21st century further highlighted the defined limits and boundaries of the pulp & paper industry as a fiercely competitive red ocean (Kim & Mauborgne 2006).

A good customer relationship may provide the companies with the needed capabilities to leverage their internal focus and offerings according to market and customer demand, and thus maximize customer equity (Blattberg & Deighton 1996). Furthermore, the role and importance of customer intimacy and loyalty for globally operating networked collaborations – using technology enabled distribution channels to reach and serve their customers – has continuously increased (Srinivasan, Anderson & Ponnnavolu 2002). To counter the structural change in the markets, Metso Paper invested in establishing new revenue streams with the intent of becoming a value-added partner for its customers throughout the whole customer and product lifecycle. Metso voiced this by stating the goal to be about transforming the company from “a supplier of machinery to a supplier of competitiveness” (Metso annual report 2001, p. 17).

To transform the company, in 2000, Metso Corporation engaged in a company transformation process to expand into customer-oriented business product and service offerings, thus tapping into the revenue possibilities offered by its globally installed base. This technology program, known as the Metso Future Care concept (Metso annual report 2001), is identified as S2 in Figure 24.

Throughout the researched timeframe, Metso demonstrated its will and ability to successfully extend its customer offering from the traditional delivery of machinery to include solutions and services together with its network partners (Aplegate, Heikkilä & Lyytinen 2004). The following is a walk-through of some of the steps the company has taken to achieve this. The year 2001 marked many changes for Metso Corporation. For one, the corporation expanded into new are-

as by acquiring the business of a Swedish company Svedala (a manufacturer of rock and minerals processing equipment). This acquisition (marked S1 in Figure 24) established Metso Corporation as a market leader in rock and mineral processing systems. It also provided Metso Corporation with an additional focal business (Metso annual report 2001) and a revenue stream that, alongside the corporation's automation and fiber and paper technology business units, was evaluated to be an "excellent fit with Metso's future care concept"³⁸.

In the beginning of our researched timeframe Metso Paper was still very much just an equipment manufacturer. Customer demand in the developed economies was mostly expected to be composed of rebuilds and modernizations, whereas investments in new capacity were seen to be realized mostly in Asia and in other developing economies (Metso annual report 2001). In 2003 Metso Corporation made a loss of 303 million euros (before taxes) and initiated a companywide renewal program (marked S3 in Figure 24) to implement and execute the needed structural changes to its operational model and the customer offering of the company. In his yearly outlook, the Metso President and CEO provided the following guidance concerning the motivation and goals for the renewal program, stressing customer intimacy as one of its change drivers:

"Operational excellency, cost awareness and the ability to react rapidly to changes in the operating environment with new innovative solutions must become a constant, inseparable part of our work. We will develop our management system to support the transfer to this operating model. Thus we can create a solid foundation for our operations in all market conditions... Metso's core business areas have developed a wide range of products for customers in the pulp and paper industry, rock and minerals processing, and process automation. I consider it important that we renew this competence in dynamic interaction with customers." (Jorma Eloranta, President and CEO of Metso Corporation, 2003)

In 2005 Metso Paper acquired Aker Kvaerner's Pulping and Power business (marked S4 in Figure 24). The justifications for the acquisition highlighted the need of Metso Paper to, according to Metso's corporate strategy, expand customer offerings towards lifecycle solutions and utilize cost savings potential by exploiting synergies amongst its businesses.

³⁸ News conference presentation "Metso and Svedala Create a World Leader in Rock and Mineral Processing Technology," September, 2001. Available: [http://www.metso.com/corporation/about_eng.nsf/WebWID/WTB-041115-2256F-B7C01/\\$File/Svedala%20decision%20Press%20set%20110901_web.pdf](http://www.metso.com/corporation/about_eng.nsf/WebWID/WTB-041115-2256F-B7C01/$File/Svedala%20decision%20Press%20set%20110901_web.pdf), retrieved 10.6.2014

“The deal [Metso Paper’s acquisition of Aker Kvaerner’s Pulping and Power business] fits well with our strategy of profitable growth ... Nowadays the customers increasingly require complete pulping solutions from one supplier. The combination of Metso Paper and Aker Kvaerner technologies would meet their demands on this front. There is also exciting potential for synergies in research and development, as well as in, for example, logistics and purchasing.”
(Risto Hautamäki, President of Metso Paper, 2005)

In 2004 and 2005 Metso executed an additional program for the renewal of Metso’s paper business concept, targeting the streamlining of the paper division’s cost structure (Metso financial statements 2005). According to Metso Paper, the business outlook for the demand for new paper machines was forecast to remain low. Simultaneously, the significance of Return on Investment (ROI) was – as an investment criteria – emphasized amongst customers. As a result of this, Metso Paper identified a growing demand for (smaller-scale) rebuilds, process improvements, and maintenance services (Metso Annual Report 2005, p.17). In response to the growing demand for aftermarket solutions and services, Metso Paper established a new service business line (marked S5 in Figure 24).

The Services business line became operational from the beginning of 2006, with the specific objective of improving customer service. In 2008, Metso Paper made significant investments to further strengthen the capability of its services and presence in China (marked S6 in Figure 24). At the same time, the company continued to adjust its capacity to correspond with “the permanently changed demand situation particularly in the area of paper and board machine technology” (Metso Annual Report 2008, p. 43). Due to these adjustments measures, the responsibilities between certain units and countries were re-defined. In practice this resulted in more of the responsibilities being moved closer to the customer base and away from Finland to China. On the level of individual sites, this move resulted in the consolidation of much of the company’s operations in developed nations into fewer and larger units (Metso Annual Report 2008).

“In the pulp and paper industry, low capacity utilization rates are expected to weaken the demand for our services business, particularly in North America and Europe. In upcoming years, we will invest more strongly in developing the services business for the pulp and paper industry. The wide installed base of machinery and equipment offers good opportunities for developing rebuild, repair,

process optimization, maintenance, and spare and wear parts services. This requires the strengthening of service resources in emerging markets close to customers.” (Metso Annual Report 2008, p. 43)

The rise of China as an emerging market posed requirements for the paper machines to be able to support the use of various different raw materials (type and quality) for paper making (Heikkilä et al. 2002). At the same time, this shift has required companies develop and have access to the capabilities needed to assume responsibility for the delivery of O/M business related services (Heikkilä et al. 2002).

In response to global megatrends, Metso Paper in 2009 communicated its R&D focus to be on sustainability (marked S7 in Figure 24). In 2010, however, this was phrased slightly differently, and although sustainability targets remain, the need for market-specific solutions was highlighted along with forest industry bio-refineries, which were mentioned as a new competence area in the making (marked S8 in Figure 24). Those themes helped to highlight the role of R&D for Metso’s sustainability, thus the company recognized bio-technology and the use of biomass as its new strategic focus area in 2012 (marked S9 in Figure 24.)

6.2.3 Technology disruptions

Technology advancements have both opened up new business opportunities for Metso Paper as well as markets for new competition. Technology has enabled the growth of Metso’s services business to surpass the earlier production focused customer offering and to capitalize on the company’s long history and knowledge in paper making. Metso’s offerings, in addition to machinery, is composed of a variety of complementary and stand-alone services, new process lines, machine rebuilds and customer required process improvements throughout a product’s lifecycle (Metso annual report 2005).

Over the researched timeframe, two distinct technology disruptions had a significant impact on the pulp and paper industry: 1) The rapid pace of technology development in the beginning of the 21st century, and 2) the requirements for product, solutions and service offering innovations. As shown in Figure 24, the net sales of services have, in the reported timeframe from 2006 onwards, an established place and by 2012 were generating around 35% of Metso Paper’s net sales.

Geographically the importance and priority of developing markets grew continuously and R&D became the source of differentiation and market leadership (Heikkilä et al. 2002). The economic rise of China in the beginning of the 21st

century opened up new opportunities and markets for Metso (Metso annual report 2009), however, the absence of proven business models and a lack of capabilities, such as technical knowledge and infrastructure, forced the company to seek out partners and collaboration (Applegate et al. 2004).

Supporting technologies that enable, for example, remote diagnostics and process management were, in the beginning of the 21st century, becoming increasingly available for commercial purposes (Heikkilä et al. 2003). Also the economic climate for the development of IT-based business models was, at the time, favorable. However, what was largely lacking, and was without available references or industry benchmarks, was an understanding of the needed business models and the means to implement them (Heikkilä et al. 2002; Applegate et al. 2004; Heikkilä 2010).

In year 2001 Metso selected four focal areas for its Future Care business concept development priority (Metso Annual Report 2001). These focal areas were:

- Development of maintenance and aftermarket service concepts for the primary needs of customers,
- Development of maintenance solutions and process upgrading with the aid of new methods based on remote diagnostics,
- Development of knowledge-based services related to the preparation and implementation of customer investments, and
- Development of customer-specific services so that customers gain a consistent picture of Metso as a total service provider

The significance of the Future Care business concept is that it demonstrates how early Metso identified customer-centricity and being close to customers as crucial for its future success. Throughout the years this trend has only strengthened and is visible from the strategic actions of the company prioritizing collaboration with its customers as well as with its ecosystem partners.

As part of our Case M research project to study the ICT potential for improving Metso's operations and paper mill productivity in China, we came across multiple success factors for the implementation of ICT-based service concepts. Our findings highlighted the fact that implementing such concepts through a collaborative business network is primarily about the management of social change, and that social change should not be trivialized nor understood in the plain terms of a technical challenge (Heikkilä et al. 2002).

While ICT-based services concepts, even by definition, require functioning ICT solutions and infrastructure to exist, they firstly require careful design, planning, commitment and implementation in order to be successfully executed. In

other words, the delivery and fulfillment of the intended offering requires carefully selected business partners and a defined business model describing the intended value realization of the networked collaboration amongst the involved parties (Heikkilä et al., 2002).

Business models require all of the associated elements to be effectively managed for the business case to be realized as intended. Brynjofsson and Hitt (2000) identified the effective exploitation of ICT as calling for the renewal of prior working methods and practices. From a finance point of view they claim this to correspond to a 1:10 ratio, where, for every euro invested in ICT, an additional investment of 10 euros should be made in the development of the organization and its members (Bresnahan, Brynjofsson & Hitt 2002).

Technology continues to change the industry and the markets. Currently the use and development of environmentally friendly raw materials and the capability to execute the cleanest possible supply chain and production process are the focus for many industries and companies. Sustainability has, in the past two decades, become an important source of competitive advantage for companies. As advancements in this area are usually heavily dependent on the technology, this means that the requirements for the innovation capability and network competences of a company are increased.

The pulp and paper industry is no exception. When evaluated from the viewpoint of Metso Paper, during the timeframe of 2002-2006 the company's R&D focused on the development of customer required services, process technologies, etc. (Metso Annual Report 2002, 2003, 2004, 2005, 2006). However, from 2007 onwards environmental aspects, such as energy saving and sustainability are mentioned as frequently, and are raised as a focus area for future R&D (Metso Annual Report 2007, 2008, 2009, 2010, 2011, 2012).

6.2.4 *Market disruptions*

Pulp and paper industry markets have become increasingly segmented and consolidated and at the same time the competition has intensified. Consolidation has followed similar trends to most other industries that have expensive, labor intensive manufacturing operations. First, the company supply chains, then other knowledge intensive responsibilities and functions gradually shift closer to the customer base.

Throughout the 21st century, cost has been a key driver behind the outsourcing and off-shoring of the labor intensive operations of companies (Heikkilä, Sajasaalo & Heikkilä 2008). With the structural change in the pulp and paper industry along with the rapid economic growth of Asia, and China in particular, the im-

portance of developing markets has grown. Figure 25 illustrates this change in terms of paper and board consumption in various regions of the world.

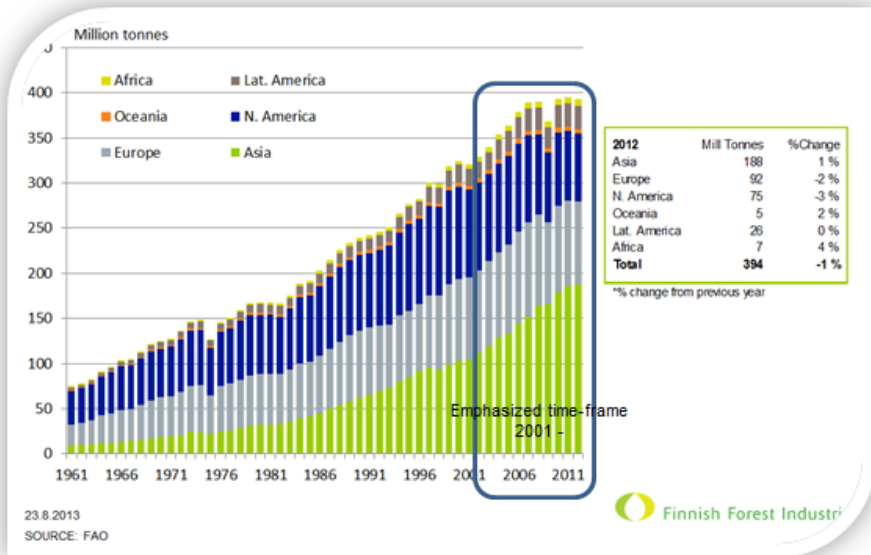


Figure 25 Paper and board consumption according to the world's regions (adapted from the webpages of the Finnish Forest Industries³⁹)

As can be seen from Figure 25, the consumption of paper and board has increased globally over the researched timeframe. In Asia, consumption has almost doubled, while in Europe and North-America the series shows no significant changes.

Figure 26 is another illustration of the change as evaluated through the production volumes of the forest industries.

³⁹ "Paper and board consumption by world regions". Finnish Forest Industry: <http://www.forestindustries.fi/statistics/tilastokuviot/Pulpandpaper/Forms/DispForm.aspx?ID=100&RootFolder=%2fstatistics%2ftilastokuviot%2fPulpandpaper%2fjulkinen%2dEN&Source=http%3A%2F%2Fwww%2Eforestindustries%2Efi%2Fstatistics%2Ftilastokuviot%2FPulpandpaper%2FForms%2FAllItems%2Easpx>, retrieved 9.10.2013

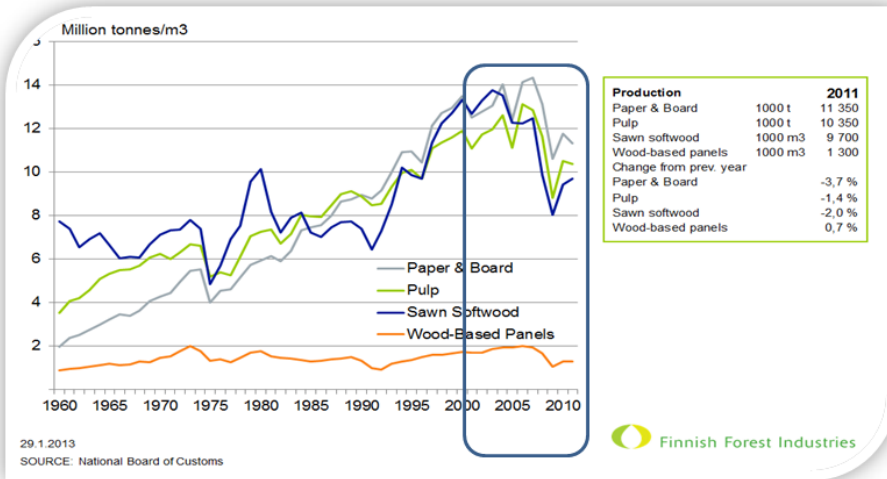


Figure 26 Forest industry’s production volumes 1960-2011 (adapted from the webpages of the Finnish Forest Industries⁴⁰)

Figure 26, in terms of especially paper and board and pulp production, highlights the effect of economic cycles on the capital intensive pulp and paper business. The economic recession of 2008-2009 is clearly visible in the graph and in the financial performance of Metso, as illustrated in Figure 24. Figure 26 shows how the markets have experienced a significant drop in demand after decades of growth.

The figures presented here (Figure 24, Figure 25 and Figure 26) paint a picture of market-related changes that forced Metso Paper to renew and adapt its operations. Market segmentation between developed and developing nations, together with simultaneous socio-economic changes, particularly in Asia, has shifted the economic focus closer to the demand base. Industry consolidation follows the same trend, and together with the growth and increased availability of both technological infrastructure and competencies, supply chain-related activities have witnessed much of the company’s R&D and other knowledge intensive responsibilities migrate into the region.

Divergent demand that is dependent on market areas and the forest industries sensitivity to market cycles emphasizes the importance of companies having an

⁴⁰ “Forest industries’ production volumes since 1960”. Available: <http://www.forestindustries.fi/statistics/tilastokuviot/Forestindustry/Forms/DispForm.aspx?ID=148&RootFolder=%2fstatistics%2ftilastokuviot%2fForestindustry%2fJulkinen%2dEN&Source=http%3A%2F%2Fwww%2Eforestindustries%2Efi%2fstatistics%2ftilastokuviot%2FForestindustry%2FForms%2FAllItems%2Easpx>, retrieved 9.10.2013

up-to-date and competitive customer offering portfolio. In fact, a business network's ability to compete with products, complementary solutions and services is critical for maintaining a sufficient revenue flow for future growth as well as gaining and protecting market share. As Metso Paper states in its evaluation of megatrends:

“Players from growth countries are increasingly penetrating developed markets, which changes the competitive environment significantly... Business success in the changed competitive environment requires added value from product development, design, know-how, brand and lifecycle services, in addition to manufacturing.”⁴¹

Our case-study revealed similar findings. Metso's situation at the beginning of the 21st century reflects how the company's success at the time, as well as today, continues to rest on its ability to offer more added-value to its customers than the competition. As one of the interviewees stated, the recipe for success is:

“We are [in the Chinese market] surely 30 to 40 percent more expensive than the average Chinese supplier, but [the client] also expects our service to be 30 to 40 percent better, of better quality and more reliable.” (Interviewee 42, 2002)

What this means in practice is that the solution and service offering of the business networks must be relevant to the intended customers and markets. At the very least, the added value of the offering for the customer should be greater than that which could be achieved with a competitor's offering. Another of the interviewees (Heikkilä et al. 2002) highlighted the importance of balancing the variables of the offering in a manner that optimizes the customers return on investment:

“The metrics [for paper machine-related variables as offering] are production capacity, paper quality and cost effectiveness. That means the consumption of water and energy should be low. And the costs of the operating personnel should be low (which should never

⁴¹ “Globalizing economy”. Available: http://www.metso.com/corporation/ir_eng.nsf/WebWID/WTB-100728-2256F-A57CF?OpenDocument&mid=061B09E09AC781EFC225776E004944ED, retrieved 8.10.2013

be said aloud, especially if it is a rebuild). The costs of raw material should be low; the machine should also run with cheap fiber ...and naturally with recycled fiber. The driving force is the cost; quality should be adequate.” (Interviewee 11, 2002)

Industry examples as well as our case research findings highlight the requirements for globally operating companies – regarding the specificity of markets and needs of customers – to configure their offering locally. The failure to support customer needs, such as capacity targets, or the inferior performance of a supplied offering could be detrimental to the reliability of the whole business network. The research into Case M provides an example of this when it shows how local market demand creates requirements for solutions and service offerings.

In the beginning of the 21st century, the availability of raw material as well as the raw material used for paper making played a role for the focal company and its network in establishing operations in the Chinese market. The cost of raw material used for the production of a certain type of paper-based product was, in the target market, significantly higher than in the Nordic countries. In addition, the alternative raw material that the customers wished to use caused concerns for our focal company and its business network regarding their ability to support the intended paper-machine production volumes and the process targets committed to – in terms of the offered Operate & Maintain service. The quote below emphasizes the requirements these market specific variables posed for the R&D function and the associated innovation capability of the business network. (Heikkilä et al. 2002)

“In Asia the distribution of labor costs and raw material costs is quite different from what it is in Finland. ... For example, in Finland the availability of long fiber is not a problem, it is, at maximum, 10% of the total cost. But in Asia, the cost of long fiber may be 40% of the total cost. That means we have to investigate how to change the production process so that it would need less long fiber. This is important for our Asian and South American customers.” (Interviewee 21, 2002)

6.2.5 Regulatory disruptions

The political decision-making process, domestic policies and the timing of elections are examples of factors that may have an impact on companies operating in, or providing goods and services for the business areas in question. Throughout

the researched timeframe there are several examples where local legislative decisions have disrupted the free movement of goods and services, despite international agreements.

For example, in 2008, Russia announced it would significantly increase the export tariffs on wood, with the apparent aim of forcing foreign companies to invest in and establish needed wood processing facilities in Russia instead of exporting raw material from Russia. The effect of the decision turned out to be as unpredictable. Instead of submitting to the announced tariff increase, Western multinational companies established alternative raw material sources, which resulted in wood exports from Russia decreasing.

Instead of discussing macro-economic issues our interviews, conducted as part of the Case M research project, revealed interesting viewpoints concerning the uncertainties related to entering and operating in the Chinese markets at that time. These considerations can be roughly categorized as resulting from issues related to cultural differences and the socialist Chinese social system (Heikkilä et al. 2002).

In countries where governments play a major role in deciding capital intensive investments, politics often step into play. For example, Metso reported Chinese financial politics – implemented to prevent the local market from overheating – had an impact on Metso’s performance and schedules in 2004 (Metso Annual Report, 2004, p.14).

The quotes below (Heikkilä et al. 2002) emphasize how regulations and politics have had an impact on business network operations and operability in the Chinese market and at various phases of the delivery projects. In the investment phase of a project, the unclear motives of some customers – due to hidden political agendas – complicated the planning of the delivery content and related aspects:

“The motives behind founding a state-funded paper mill are rather unclear to many foreigners operating in China. The location of the mill, or the type of paper produced defies our Western sense of logic. The decision of a new paper mill seems to be more a political than an economical decision. Paper mills have been erected in areas, where there is no real demand for the type of paper the mill is to produce. The motives to build the mill may be to create more jobs in the area as a part of a political agenda. ” (Interviewee 32, 2002)

“The basis is totally different. A Western company, starts from a market or feasibility study, to see whether it is reasonable to intro-

duce a new paper machine to the market. If it looks promising and the board of directors approves it, then it proceeds to an investment decision. In China this is totally different. Sometimes it feels like no one even has given a thought to making [market] analyses. There is no market for this kind of paper. Someone has just decided that a mill will be built there.” (Interviewee 33, 2002)

Whereas the same regulatory intervention may also provide shelter from economical fluctuations:

“[Central planning] has the advantage of being continuous, it does not fluctuate. In contrast, when it is dependent on private capital, there is a risk that investments will start to fluctuate.” (Interviewee 37, 2002).

“The state-owned firms in China also have a social mission. In China there is no social security system similar to ours ... The state has really no business interest in paper mills. But they have a socio-political interest. There is no social security system, you cannot leave the companies alone, because they would all go bankrupt. And if they go bankrupt, the people would lose their jobs, and then disturbances start.” (Interviewee 22, 2002)

International agreements as well as governmental desire to ensure the future competitiveness of a country also manifest themselves in terms of regulatory disruptions. Investments concerning large capital expenditures, such as building a new plant or new paper machine lines, often involve permits being obtained or depend on financial support or government funding. As such, the timing, content requirements and partners used in a delivery project may all be affected. The Case M interviews illustrate the effect of legislation and regulations for delivery project content (Heikkilä et al. 2002):

“There are concerns about environmental and security issues. New laws and clauses are imposed all the time and they regulate what things are allowed. Hence they also generate new needs.” (Interviewee 41, 2002)

As do the requirements related to the establishment and use of local supply chains:

“The idea that the Chinese seek to be self-sufficient at some point should be taken seriously. We need to find a way to stay strong in the business. To do this we need the right concepts and to operate locally. I don’t see it being possible in the long run that all the production machinery would come from abroad. At the very least, the Chinese government wishes to have production inland.” (Interviewee 54, 2002)

From the viewpoint of a business network, regulatory disruptions, such as those described above, cause problems in terms of limiting the visibility of timing and the content and scope of delivery projects. Requirements for the utilization of local suppliers may also result in existing partnering arrangements being unusable for the delivery project, and may force the collaboration to accommodate new partners.

6.2.6 Results of the longitudinal contextual analysis

Based on the longitudinal perspective of the contextual analysis, two aspects deserve to be highlighted. Firstly, structural changes in the pulp and paper industry, technology advances and regulatory changes have permanently altered the competitive strategies of the focal companies in this industry. These changes have forced companies to rethink their operations and find ways to continuously drive down costs and innovate, while simultaneously assuming larger responsibility over the management of the whole of the customer lifecycle.

Secondly, networked innovation capability, as demonstrated by Metso Paper’s competitive customer service offering has become an increasingly more critical success factor for established companies. In the presence of many low cost competitors, an advanced offering product portfolio, which is built on the various competencies of the industry’s ecosystem, has become critical for the sustainability of the business in the long run, but it also makes it possible for a focal company and its business network to make higher operating profits.

Competencies related to the management and coordination of co-creation networks have become crucial for providing the means and the access to the competencies required for the focal company to assume responsibilities over customer lifecycle management. Interestingly, innovations that have enabled Metso Paper to sustain and even succeed are not visible in the form of an independent disruptive technology or business model innovations. Rather, critical success factor for Metso Paper seems to be based on a combination of self-sustaining technological

innovations delivered in conjunction with radical business model changes that emphasize the use of the co-creation capabilities of network partners, and the role of collaborative business networks for the creation and delivery of joint offerings.

6.3 Analysis II: Nokia

6.3.1 Occurrence and effect of disruptions on Nokia

The case example is created from the focal company viewpoint; Nokia as a mobile device manufacturer and a provider of Internet-based services and solutions. The external and internal viewpoints highlighted in Figure 27 are presented and considered from the focal company perspective. Financial information and the identified strategic actions used and highlighted in Figure 27 are collected from the annual reports (Annual Report, form 20-F) of Nokia between 2003 and 2012, and made publicly available through the company's webpages.⁴² Due to the authors role as a reflective practitioner being employed by Nokia for the most part of the researched time frame the professional experience, insight, and other empirical evidence collected in terms of Case N2 is especially utilized in the building of the construct for the analysis, analysis work in itself, and in the interpretation of the subsequent analysis results on Nokia and its networked collaboration (Klein & Rowe 2008).

Use of applicative knowledge for theory building and for the validation of research findings requires methodological foundation and well defined research approach (Klein and Rowe 2008). Here the method of analysis follows that of longitudinal contextual analysis by Pettigrew (1987) complemented with use of RISP approach (Heiskanen 1994; Heiskanen & Newman 1997). Whereas the former provides means for the longitudinal inquiry on the process of change, the latter deepens the analysis by providing tools to incorporate practice-based complementary insight, intuition and implicit learning (Klein & Rowe 2008) for the benefit of qualitative analysis.

Disclosure of confidential information gained through my employment in Nokia and for the benefit of the analysis is naturally not possible. Reflective practitioner as a professionally qualified doctoral student (Klein & Rowe 2008) however provides value for the longitudinal contextual analysis through increasing the level and understanding on the surrounding interconnectivities and causa-

⁴² Nokia Corporation financial reports (annual reports (form 20-F)) Available: <http://www.nokia.com/global/about-nokia/investors/financials/reports/results---reports/>

tions in the domain of inquiry. As such, my role as a reflective practitioner serves in, first, constructing meaningful setup for analysis, second, in the selection and interpretation of existing knowledge in the studied context and, third, for the analysis to generate new knowledge as its outcome. The elements in the graph are introduced in more detail next.

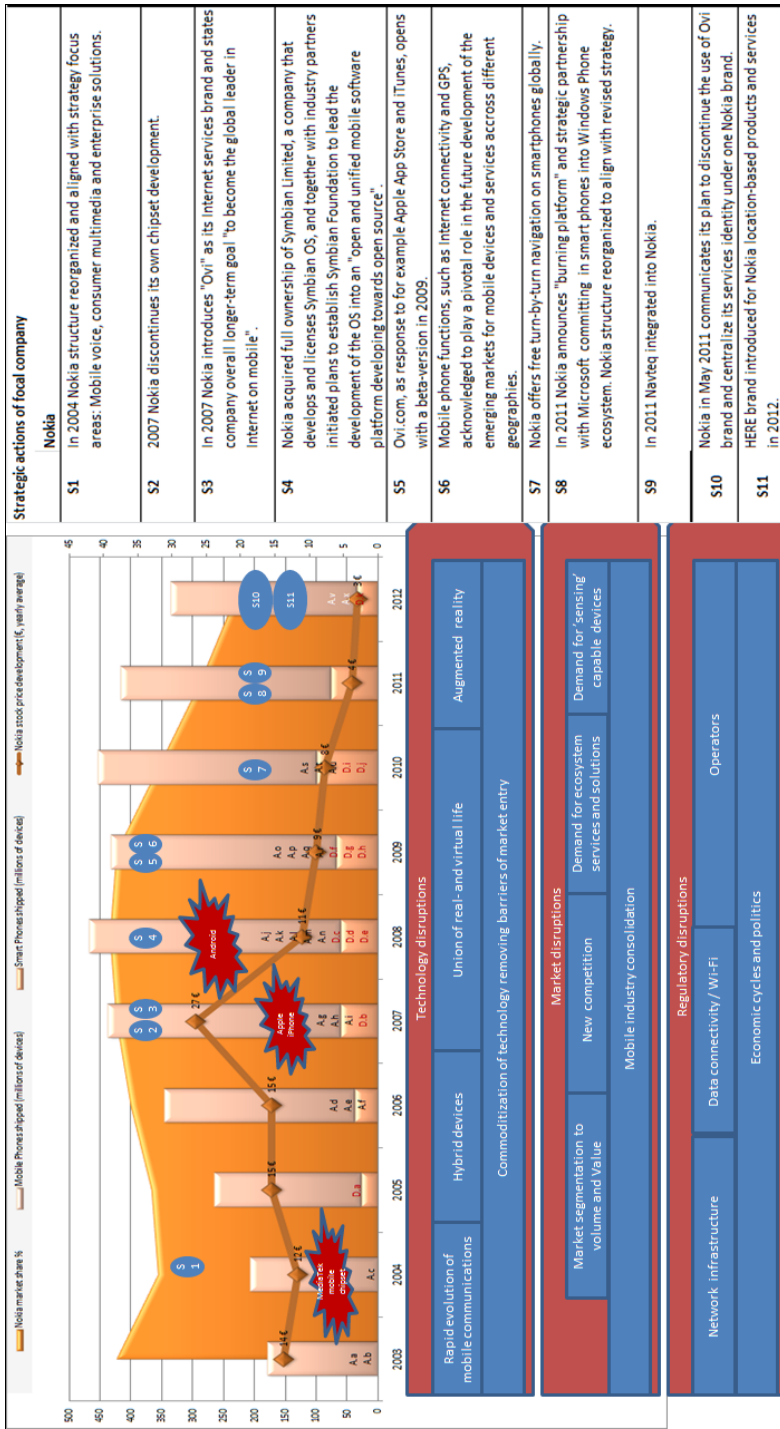


Figure 27 Contextual longitudinal analysis of Nokia's mobile devices division.

Nokia's market share information (as presented in Figure 27) is collected from the annual reports of Nokia, and thus based on the company's own estimates of the total mobile industry market size. The market share is presented as a percentage of the total mobile industry.

Information on the acquisitions and divestments is collected from Nokia Corporation's webpages.⁴³ Acquisitions and divestments not directly related to Nokia device manufacturing and/or Internet-based business (including those related to Nokia Networks business unit or later Nokia Siemens Networks / Nokia Solutions and Networks business unit) are deliberately excluded from the graph. Empirical evidence basing on practice (specifically through Case N2) is here utilized to determine those relevant acquisitions and divestments to provide further insight into the actions Nokia performed in an attempt to meet its strategic goals.

Information on the amount of units shipped in a given year (mobile phones and smart phones) is likewise collected from Nokia's annual reports. Here the classification of devices as either mobile phone or smart phone is based on Nokia reporting practices. Prior to 2005, the classification between product segments was not separately reported. The amount of units shipped is presented as millions of devices shipped within a given year, and by definition includes the devices in the channel inventories. The amount of devices shipped, in other words, does not fully correlate with the amount of devices sold per year.

Nokia's stock price development is based on the Nokia stock charting tool information.⁴⁴ Due to the nature of the company share value being highly speculative. The value and use of stock price information is solely for indicative purposes, so as to represent the market's estimates of Nokia's value development within the timeframe.

Empirical evidence from Case N and N2 provides the backbone for the identification and presentation of relevant market-, technology- and regulatory disruptions for the longitudinal analysis. Conceptualization, sequence and duration of disruptions used in the graph are naturally somewhat speculative. These disruptions however are selected for the detailed analysis due to their capability to provide for the necessary punctuations to establish a holistic storyline for better understanding supply management relevant changes and change needs on Nokia's strategy, business model and networked collaboration. Information on disruptions are presented as bars below the graph.

⁴³ Information on yearly acquisitions and divestments. Available: <http://www.nokia.com/global/about-nokia/investors/acquisitions-and-divestments/acquisitions-and-divestments/>, retrieved 17.7.2013

⁴⁴ Stock charting tool. Available: <http://www.nokia.com/global/about-nokia/investors/stock-tools/stock-charting/stock-charting/>, retrieved 18.7.2013

Strategic actions of the focal company are labeled S1-S11 and pasted on the graph itself. These are again selected based on the author’s practice-based experience from working in the industry, and from select information available through annual reports and from other publicly available sources – as based on their significance for the industry, company strategy and inter-company collaboration. Certain competitor actions are additionally included in the analysis timeline. These competitor actions are labeled C1, C2 and C3 and are selected due to their significant impact on focal company strategy execution and long-term success.

6.3.2 Mobile industry disruptions driving changes in Nokia

While the journey of Nokia from a local Finnish conglomerate to become a global market leader took guts, courage, time and luck, its subsequent fall to a challenger position has been rapid. Figure 28 illustrates the development of Nokia in terms of its percentage share of Finnish gross domestic product.

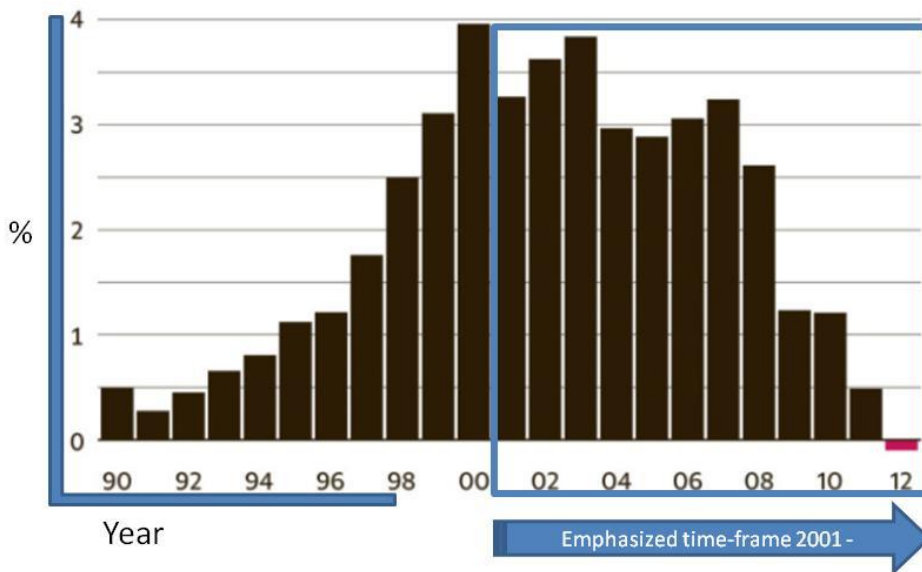


Figure 28 Percentage share of Nokia as part of Finland’s gross domestic product (modified from Helsingin Sanomat⁴⁵)

⁴⁵ Helsingin sanomat, “Nokian osuus Suomen bkt:stä painui negatiiviseksi”. Available: <<http://www.hs.fi/talous/Nokian+osuus+Suomen+bktst%C3%A4+painui+negatiiviseksi+/a1369884880417>> (retrieved 31.5.2013)

For a relatively long time Nokia held the position as the world's biggest mobile manufacturer. In terms of Gross Domestic Product, Nokia, without taking the multiplier effects resulting from sizeable collaboration and subcontracting operations into account, represented just under 4% of Finnish GDP (Ali-Yrkkö 2010). Since 2010 the amount of Finnish GDP that Nokia accounts for has sunk to below 0.5%.

Between 2004 and 2008 Nokia's market share grew year-on-year, and the company was regarded as an innovator in its field. Nokia spearheaded the mobile convergence by releasing its first camera phone (in 2002) and then later introducing the Nokia Nseries (in 2005) as a product category of advanced multimedia devices designed for imaging, websurfing, mobile TV, music and email. Some of the innovations Nokia introduced were ahead of their time in terms of the maturity and readiness of the mobile market to pick up and embrace the increased functionalities the company offered. Examples of such cases include Nokia driving Wi-Fi connectivity into many of its mobile devices (Doz & Kosonen 2013), and the launch of two non-cellular Internet tablets optimized for Internet communications in 2006 and 2007. For various reasons, perhaps being brought to market too early, these product innovations did not succeed in creating the needed critical mass amongst consumers at the time, but nevertheless highlight the innovation capability of the company.

Change in the markets was sudden. Figure 29 illustrates mobile markets in 1st quarter 2013 from two viewpoints: 1) global phone sales to end users by vendor (all mobile devices), and 2) global smartphones sales to end users by operating system (ecosystem).

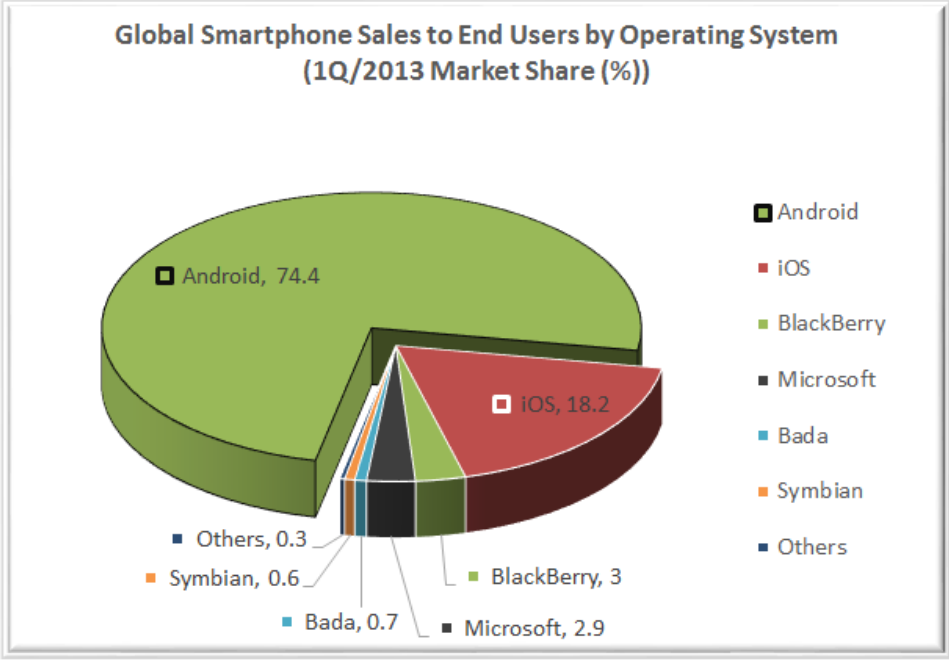
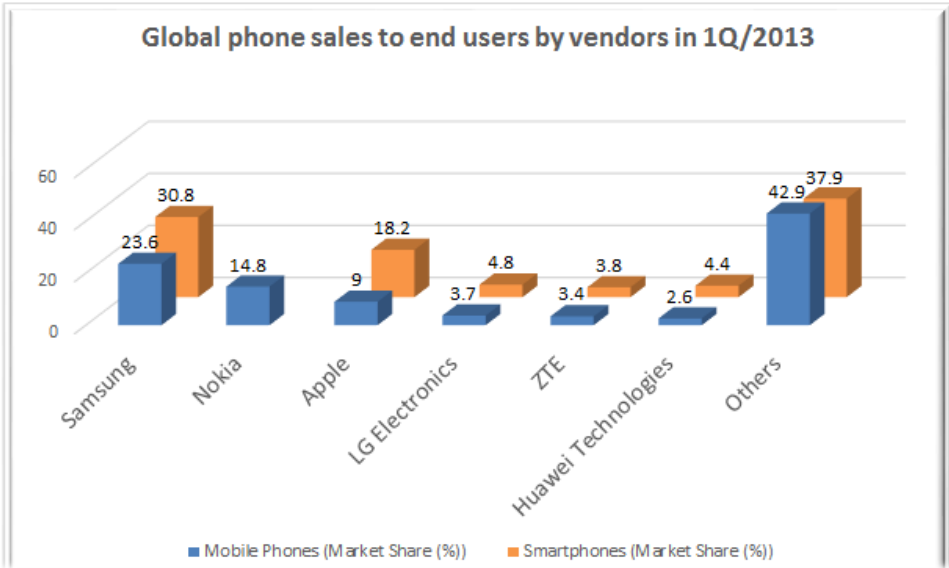


Figure 29 Mobile devices market in 1st quarter 2013 (modified from Gartner⁴⁶)

⁴⁶ Gartner press release (14.5.2013): "Gartner Says Asia/Pacific Led Worldwide Mobile Phone Sales to Growth in First Quarter of 2013." <http://www.gartner.com/newsroom/id/2482816> (retrieved 2.5.2015)

Figure 29 highlights the market uncertainty⁴⁷ (Sainio et al. 2012) and industry change (Sabel & Saxenian 2008; Ali-Yrkkö 2010; Lehti et al. 2012; Doz & Kosonen 2013). As recently as 2009 Nokia held the leading position as the world's largest mobile phone manufacturer. When its market share peaked, it held slightly over 40% of the total global mobile market share.⁴⁸ In the more specific smart phone segment the company dominated with approximately a 50% market share⁴⁹. Since then Nokia's market share (all devices) has shrunk from nearly 40% to the 14.8-16.6% global market share reported for 1Q/2013. In smartphones the fall has been even more abrupt and fallen from nearly 50% to the 1Q/2013 reported 3% market share (Helsingin Sanomat⁵⁰; Tekniikka ja Talous⁵¹).

It is worth noting that there was a shift in the perspective of mobile devices to a more detailed classification, according to which they either belonged in the smart phone category or in the mobile phone category (representing standard feature phones). The change in industry players highlights how the competitive environment has – at the expense of earlier volume manufacturers – changed in favor of the most customer-centric companies. Indeed, within a decade, competition and customer demand has driven the mobile industry product segregation to the point where, for the smart phones category, the competition is taking place between ecosystems, rather than between individual firms.

For a long time the success factors of Nokia were traced to its supply chain management (Bouwman, Carlsson, Carlsson, Nikou, Sell & Walden 2014; Cord 2014). In 2007 Nokia was ranked as the world's leading supply chain. This ranking was made by AMR Research who investigated the top 25 supply chains of

⁴⁷ Sainio et al. (2012, p. 593) define market uncertainty as “an important contingency factor... [that can be defined as] change in and unpredictability of customer demand and competition in the markets”.

⁴⁸ “Mobile Device Vendor Market Share, 2Q 2008.”

<http://myelectronicsblog.blogspot.fi/2008/08/2nd-quarter-of-2008-proves-fruitful-for.html> (retrieved 8.1.2013)

⁴⁹ “Global Smartphone Market Share Trends: Android, iPhone Lead, Windows Phone Struggles.” Available: <http://www.tech-thoughts.net/2012/07/global-smartphone-market-share-trends.html> (retrieved 3.1.2013)

⁵⁰ Helsingin Sanomat (27.4.2013): “Nokia romahti pienten joukkoon älypuhelimissa.” <http://www.hs.fi/talous/Nokia+romahti+pienent+joukkoon+%C3%A4lypuhelimissa/a1366956387609> (retrieved 27.4.2013)

⁵¹ Tekniikka ja Talous (3.10.2008): “Kännykkämarkkinoiden murros haastaa Nokian.” <http://www.tekniikkatalous.fi/ict/kannykkamarkkinoiden+murros+haastaa+nokian/a143759> (retrieved 29.5.2013)

manufacturers and retailers. According to a press release published June 1st, 2007⁵² by Nokia:

"As a pioneer in value chain strategy, Nokia has led in supplier development, sales and operations planning, and collaborative product development ... The report [by AMR Research] looked both at financial performance and publicly visible leadership in supply chains. Nokia's strengths proved to be its net income and total assets, inventory turns, and 2006 revenue growth... According to the report, excellence in the demand-driven supply chain is a combination of visibility communication and reliable processes linking together the three key areas of supply management (including manufacturing, logistics and sourcing); demand management (including marketing, sales and services), and product management (including research and development, engineering and product development)." (Nokia press release, June 1, 2007)

From the press release the significance of both Nokia's supply network (referred to as supply management) as well as its customer orientation (referred to as demand management) are highlighted as success factors. This same is also acknowledged by Robert Andersson, who was then Executive Vice President of Nokia Customer and Market Operations function. He commented on the ranking by saying:

"In 2006, Nokia manufactured and sold 347 million mobile devices, which means 11-12 units per second, 24/7. This would not have been possible without comprehensive planning and execution throughout our whole demand supply chain, including suppliers, subcontractors, manufacturing, sales and channel management, customer collaboration and logistics. So we feel that this ranking is also recognition of our excellent partnership community." (Robert Andersson, EVP of Nokia CMO, in Nokia press release published June 1, 2007)

To gain, maintain and then later regain its market relevance Nokia has taken several strategic actions. Similarly to companies such as StoraEnso and Metso in the paper and pulp industry, Nokia also underwent significant restructurings

⁵² Nokia press release issued June 1st, 2007: "AMR Research ranked Nokia's global supply chain number one in the world." Available: <http://press.nokia.com/2007/06/01/amr-research-ranked-nokias-global-supply-chain-number-one-in-the-world/> (retrieved 30.5.2013)

within the researched timeframe. In 2002 Nokia restructured itself under four main divisions (Nokia Mobile Phones, Nokia Networks, Nokia Ventures, and Nokia Research Centre). According to some academics, in example Bouwman et al. (2014, p. 4), this time period and organizational structure are seen as a substantially important milestone for the company, signifying when Nokia first began to develop and market smart phones.⁵³ This finding is in contrast with the results of the longitudinal contextual analysis performed here, which demonstrates that Nokia, while being successful in the creation and launch of a multitude of converged devices, has been unsuccessful in its attempts to venture outside of the product paradigm towards solutions and services. As the analysis will highlight, as a result of this deficiency, Nokia finds itself in the position of an underdog in the segment of high-end mobile devices.

In 2004, Nokia identified the ongoing industry convergence and finalized the structuring of the company according to its strategy in distinct focus areas: mobile voice, consumer multimedia, and enterprise solutions. This restructuring is presented here as a significant strategic action by Nokia because it highlights the company's intentions to serve distinct consumer segments with tailored offerings. This strategic action is shown in Figure 27 as S1.

In emerging markets the competition has, throughout the researched timeframe intensified. In 2004 MediaTek put its first mobile chipset on the market (this competitive action is highlighted as C1), demonstrating the ability of competitors to commoditize technology in ways that lower the entry barrier for new competition and which can bring localized offerings to a market and with a short time-to-market lead-time (Nokia Annual Report 2004; Bagur 2012).

Based on findings from Nokia's annual reports, the company seems to have neglected to acknowledge the change in the markets and the competitive landscape. For example, up until 2006 Nokia seems to have positioned itself as a device manufacturer trusting the company's strong market position in order to offer the needed competitive advantage to protect the company from emerging competition (Nokia's annual reports 2004; 2005; 2006). Only as late as in 2009 did the annual report visibly demonstrate the company as identifying the demand pattern in emerging markets to have neared that of more developed markets:

⁵³ The use and definition of the term 'Smart Phone' in different contexts continues to be ambiguous. According to the conceptualization by Bouwman et al. (2014, p. 5) – describing smart phones as “device[s] that combined telephony capabilities with palmtop computer capabilities” – the first Nokia smart phone launched would have been the Nokia Communicator 9000, combining cellular phone capabilities with a PDA, launched back in 1996.

“More and more mobile devices, including many of our most affordable models sold predominantly in emerging markets, offer Internet connectivity and are equipped with GPS, and we believe that these features, especially in combination, will play a pivotal role in the future development of the market for mobile devices and services across different geographies.” (Nokia annual report 2009, p. 34)

The significance of this development is that it represents change in the market requirements and in the competitive landscape. This turning point is represented as strategic action and labeled S6 in Figure 27.

In 2007 Nokia made a clear strategy change by outsourcing major parts of its own chipset development (marked S2 in Figure 27). Nokia commented on the change with the following statement that highlights the motives behind the decision:

“This [renewal of Nokia chipset development strategy] will allow Nokia to focus on its core competencies in chipset development, leverage external innovation, and foster competition in the chipset industry. Under this renewed strategy Nokia will discontinue parts of its own chipset development and expand its use of commercially available chipsets ... This licensing and multisourcing strategy will allow Nokia to broaden its pool of chipset suppliers and leverage external innovation to support its wide range of products. It will also allow Nokia to focus on its core competence in modem technology and invest in R&D areas besides radio technology ... Companies in this industry need to focus on areas where they can add value and partner with others where it makes sense. We believe that our renewed strategy will allow us to concentrate on developing core chipset technologies, while increasing our R&D efficiencies and improving our agility in a fast-moving marketplace.” (Nokia press release, 8th of August 2007⁵⁴)

What becomes evident is the company’s desire to focus on its core competencies, mitigate component availability risks and increase competition amongst suppliers. Through the selected multi-sourcing strategy the company also ex-

⁵⁴ Nokia press release “Nokia renews its chipset development strategy”. Available: <http://press.nokia.com/2007/08/08/nokia-renews-its-chipset-development-strategy/> (retrieved 23.1.2014)

pected to boost its own as well as harness suppliers' innovation capabilities for the benefit of the industry.

In 2007 the mobile industry changed dramatically when the first iPhone was launched by Apple (marked C2 in Figure 27). This competitive action highlights the competitors executing their blue ocean strategy (Kim & Mauborgne 2006) – in terms of rethinking of the value proposition of a mobile phone as a value innovation that revolutionizes the modern smart devices markets. In the process of doing so, Apple was able to render some of the earlier competitive assets of Nokia, such as its manufacturing excellence, economies of scale and global delivery capability, obsolete.

Later in the same year Google announced its cooperation with other mobile industry companies under an initiative called “Open Handset Alliance⁵⁵”, which marks the birth of the Android ecosystem (marked C3 in Figure 27). In response to these disruptions, Nokia introduced “Ovi” as its Internet services brand, and announced a new long-term goal for the company: “To become the global leader in Internet on mobile” (Nokia annual report, 2007). This strategic action is marked S3 in Figure 27.

Technology, networks, and knowledge fuel innovation and enable companies to focus on the needs of customers (Kandampully 2002). However, a successful network innovation capability must be built on and designed to exploit those attributes in order to yield value. Figure 30 presents a comparison of the mobile industry R&D effort and provides another comparison regarding the resource utilization of the R&D efforts of Nokia and Apple.

⁵⁵ Open Handset Alliance announcement “Industry Leaders Announce Open Platform for Mobile Devices”. Available: http://www.openhandsetalliance.com/press_110507.html (retrieved 24.1.2014)

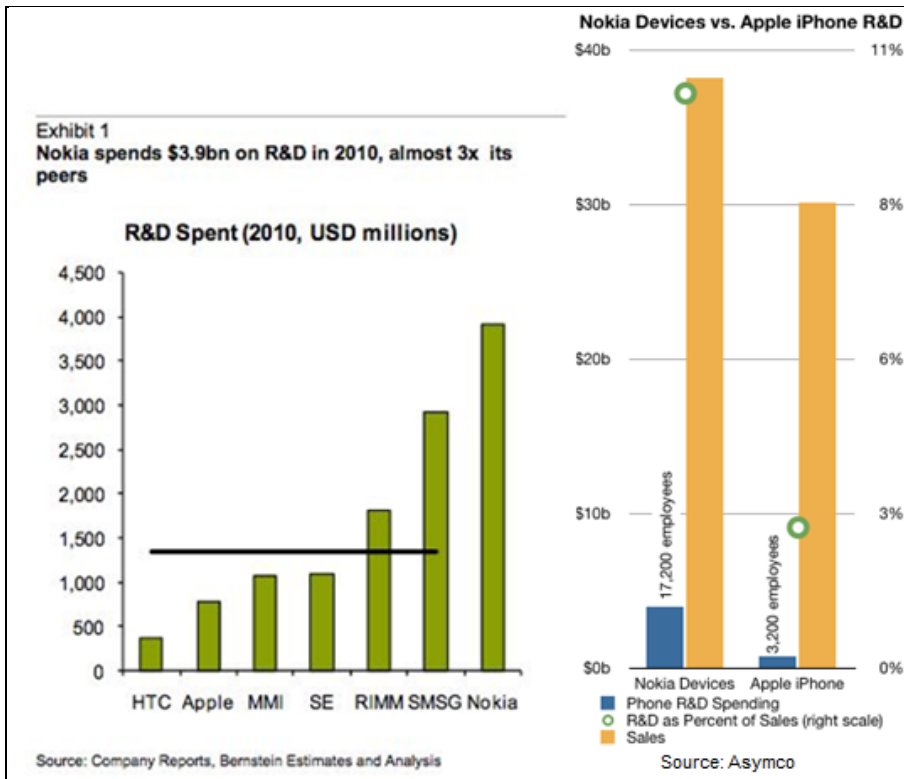


Figure 30 Comparison of the mobile industry R&D effort (in millions of USD) and the resource utilization of Nokia and Apple for phone R&D in 2010 (taken from All Things D. Original Source: BEA⁵⁶ and Asymco⁵⁷)

Figure 30 highlights the significant differences in the size of the companies' R&D efforts. Clearly, money spent in R&D does not correlate with a company's success in the marketplace. The question that arises is whether the companies not succeeding in the market place have invested in the development of the wrong innovation, or if the problem lies in their capability to commercialize and capitalize on their investment? According to Cord (2014) the structure and organizational culture of Nokia are, at least in part, amongst the factors that prevented Nokia exploiting its innovation potential.

⁵⁶ All Things D: "Not Seeing Much Return on That Massive R&D Spend, Are You, Nokia?" http://allthingsd.com/20110203/not-seeing-much-return-on-that-massive-rd-spend-are-you-nokia/?reflink=ATD_yahoo_ticker (retrieved 29.5.2013)

⁵⁷ Asymco: "Nokia employs as many people to develop its smartphone software as Apple does to develop all its products." <http://www.asymco.com/2011/02/04/nokia-employs-as-many-engineers-for-symbian-and-meego-as-apple-does-for-all-its-product-lines/> (retrieved 11.9.2013)

The literature on disruptive innovation suggests established companies often face difficulties in exploring and experimenting with their business models (Sandström 2010). More precisely, existing business model interdependencies between a focal company, its customers and its network partners may result in rigidity, conflicting interests and resistance preventing a network innovation capability being incubated or being used to exploit disruptive innovations (Christensen 1997; Sandström 2010). Company acquisitions, according to Doz & Kosonen (2013, p. 212), provide companies with opportunities to widen their strategic perspective to identify and exploit growth opportunities outside of their traditional field of operation. These acquisitions may, furthermore, provide the companies with the strategic sensitivity to deal with unexpected and unforeseeable disruptions (ibid.).

Nokia's business model was geared towards the realization of the company's strategic intent of becoming a leading Internet company. To reach this goal, the company performed a series of company acquisitions. Company acquisitions between 2006 and 2010 highlight the steps the company took to realize its strategic intent. These aggressive rather than collaborative actions demonstrate Nokia's attempt to co-create unique customer offerings instead of forming partnerships, and to buy out and merge those companies with cutting edge, appealing, and complementary offerings under the Nokia Corporation and brand.

Table 14 depicts the aggressive acquisition (A.a - A.x) and divestment (D.a - D.k) strategy of Nokia. It provides an intriguing view of the changes in both strategy and focus for Nokia over time. Some company names in the table do not automatically make clear the type and nature of business they conduct. Therefore, to aid the reader, some small characterizations about the type of business acquired or divested is provided if the information is not otherwise self-evident. These characterizations are neither exhaustive nor official descriptions on how the companies in question have defined themselves or their organization's strategic intent. The characterizations in Table 14 are based on information provided through publicly available Nokia webpages and press releases⁵⁸.

⁵⁸ Webpages of Nokia Corporation, "Acquisitions and divestments". Available: <http://www.nokia.com/global/about-nokia/investors/acquisitions-and-divestments/acquisitions-and-divestments/>, retrieved 26.11.2013

Table 14 Nokia's acquisitions and divestments 2003-2012

Nokia acquisitions (A) and divestments (D):	
2003	A.a. Eizel Technologies (content format transformation for mobile devices) A.b. Sega.com Inc. (online games and service offering)
2004	A.c. Metrowerks Corporation (applications development technology)
2005	D.a. Nextrom Holding (manufacturing solutions and services to the fiber optic industry)
2006	A.d. Intellisync (device management support for MS ActiveSync settings) A.e. Loudeye (digital music platforms and digital media distribution services) A.f. Gate5 (mapping, routing and navigation software and services)
2007	A.g. Twango (media sharing solution) A.h. Enpocket (mobile advertising) A.i. Avvenue (remote access and view for PC files) D.b. 3G chipset development
2008	A.j. Plazes (context-based service offering with social presence and time-based activity planning features) A.k. Navteq (Mapping and location based services) A.l. Full ownership of Symbian Ltd. A.m. Trolltech ASA (Qt software for cross platform software strategy). A.n. Oz communications Inc. (mobile messaging solution provider) D.c. Nokia's Identity Systems D.d. Nokia's Adaptation Software R&D entity D.e. Nokia's line fit automotive business
2009	A.o. bit-side Gmph. mobile development for Nokia Maps A.p. cellity (social networking) A.q. Plum (social location services) A.r. Dopplr (internet based communities) D.f. Nokia's security appliance business D.g. Nokia's Symbian Professional Services D.h. Venyon Oy (Nokia shares in a company focusing on NFC technology development)
2010	A.s. Meta-Carta (geographic intelligence technology for local search) A.t. Navarra Inc. (new browser technology and cloud services for Series 40) A.u. Motally Inc. (mobile analytics service) D.i. MetaCarta's enterprise business D.j. Nokia's wireless modem business
2012	A.v. Scalado (mobile imaging) A.x. earthmine Inc (3D map making) D.k. Vertu (Nokia luxury mobile phones)

In response to the challenge posed by the Open Handset Alliance, Nokia acquired full ownership of Symbian Limited in 2008, a company that developed and licensed the Symbian Operating System (marked S4 in Figure 27). Together with its industry partners, Nokia initiated plans to establish the Symbian Foundation and to lead the development of the OS into an open, unified mobile software platform that was to be developed in an open source direction (Nokia Annual Report 2008; Orłowski 2010).

Ovi.com, the consumer interface for Nokia's internet based offering opened in 2009 (marked S5 in Figure 27). The launch of Nokia Ovi and its associated services in 2009 were designed to challenge the application ecosystem of both Apple and Google. Nokia chose to launch its Internet-based services at their beta-

phase, a strategy criticized by many (the interested reader should read about the perceived customer user experience and service design⁵⁹).

In 2008 Nokia finalized its acquisition of Navteq with the aim of creating a platform for location-based internet services for mobile devices.⁶⁰ To compete against companies such as Google, and to find synergies between Internet-based services and mobile devices, Nokia designed new, even radical, business models in 2010. One example of this being Nokia offering its turn-by-turn navigation capability to consumers for free on select Nokia smartphones. This strategic move serves as an example of the ways different value-creation logics and assets, such as location-based services, increasingly became a pivotal part of the company's smartphone strategy. The example furthermore highlights the role of mobile devices increasingly becoming dependent on the availability of rich content and continuous internet connectivity. This strategic action is marked in Figure 27 as S7.

Location-based services have continued to play a major role in later Nokia strategy and in the, so called, war of the ecosystems. In latter half of 2010 Nokia's strategy was again set to be revised when a new president and CEO Stephen Elop took up his post. In February 2011 Nokia announced the company to be, figuratively speaking, on a "burning platform" and introduced the company's new strategy and the subsequent structural changes within the company. This is again highlighted as strategic action (S8) in Figure 27.

"The game has changed from a battle of devices to a war of ecosystems ... The emergence of ecosystems represents the broad convergence of the mobility, computing and services industries." CEO of Nokia, Stephen Elop, January 27th, 2011

At this time a strategic partnership with Microsoft was made public, positioning the company smartphones into the Windows Phone ecosystem. Location-based services were communicated as a strategy focus area resulting into Navteq later being fully integrated as a business division within Nokia in 2011 (marked

⁵⁹ See for example: "Nokia Ovi Store Now Open to Everyone". Available: <http://mashable.com/2009/05/25/nokia-ovi-store-live> (retrieved 9.9.2013), "Nokia Ovi Store-Launch is a Complete Disaster" available://techcrunch.com/2009/05/26/nokia-ovi-store-launch-is-a-complete-disaster/(retrieved 9.9.2013). Or "Glitches plague Nokia's Ovi Store launch". Available: http://news.cnet.com/8301-17938_105-10249724-1.html (retrieved 9.9.2013)

⁶⁰ Nokia stock exchange release "Nokia completes its acquisition of Navteq" published 10 July 2008. Available: <http://press.nokia.com/2008/07/10/nokia-completes-its-acquisition-of-navteq/>, retrieved 27 January 2014.

S9 in graph 28). In May 2011, the Ovi brand was discontinued (strategic action S10 in Figure 27) and the whole of Nokia services identity, including location-based services, were consolidated under one Nokia brand, today known as the HERE brand (see S11 in Figure 27).

6.3.3 *Technology disruptions*

The commoditization of technology in Figure 27 refers to an ongoing disruption playing a major disruptive role in the transformation of the mobile industry. Through the availability and the use of commercially available technology, such as mobile chipsets, the entry barrier has been significantly lowered for new market entrants. In addition, through the use of commoditized technologies, new competitors may benefit from a reduced need for and costs associated with R&D. This development has resulted in increased market segmentation, the increased availability of localized product offerings and increased competition at various price points (Nokia annual report 2008 p. 13). Nokia describes the foreseeable impact of this development on its operations with the following words:

“Mobile device markets are also becoming more segmented and diversified and we face competition from different mobile device manufacturers at different user segments, price points and geographical markets using different competitive means in each of them. This may make it more difficult for us to compete successfully across the whole mobile device market against more specialized competitors and to leverage our scale to the fullest extent.” (Nokia Annual Report 2008, p. 14)

The commoditization of mobile technology continues with mobile devices becoming increasingly modularized. While this development may to a certain extent hinder a company’s ability to differentiate their product offering, it also provides advantages by enabling, amongst other benefits, a shorter time-to-market, reduced inventory risk – due to a lack of need to stock multiple components, and increased flexibility, all of which are achieved by pushing the customer order decoupling point closer to the customer interface.

Disruption referred to as the ‘rapid evolution of mobile communications’ is about the continual change that enabled the emergence of the telecommunications industry – and its independent mobile devices – in the first place. Since then, the disruption has continued to grow, exceed, and mix the boundaries between established and previously separate industries. Within the mobile industry this continuum is often referred to as digital convergence (Nokia Annual Report

2008), referring to the consolidation of functions and features from across a multitude of industries and devices (Yoffie 1997). Ala-Pietilä commented on digital convergence by highlighting the fact that the diversity of the mobile industry continually expands:

*“The traditional boundaries between telecommunications, information technology, media and entertainment industries are fast disappearing... Digital convergence marks the creation of a new industry... that is wider and more versatile than mobile telephony alone.”*⁶¹(Pekka Ala-Pietilä, 2004)

For Nokia the rise towards a dominant position within its market segment began from the deregulation of the European telecommunications industries in late 1980s and from the breakthrough of GSM technology as the European digital standard in 1991 (Nokia Annual Report 2010, p. 40). Increased coverage and the development of network technology, including increased data transmission speed, has thereafter played a key role in enabling digital convergence to continue and expand into wireless services and internet-based solutions. Together with increased standardization within the industry, it also lowered the entry barrier for new competition in a market previously dominated by big mobile manufacturers.

Disruption referred to as ‘hybrid devices’ in Figure 27 relates to the birth of market demand for mobile device support for single-purpose product features, for example, cameras, music players, computers and gaming consoles. The beginning of the hybrid device era takes place in the first years of the 21st century when the first mobile devices with an embedded camera and music player features were brought to market. The relevance of this disruption for the later segregation of the mobile market place is significant because these hybrid devices represented the first embodiments of the product category that has since evolved into modern smartphones.

In this segment of hybrid mobile devices the price of gadgets, their use, and the availability of the surrounding infrastructure have traditionally limited their adoption rate, especially in emerging markets. Such limitations have thus contributed to the requirements placed on a company’s business networks and collaborative business models when simultaneously supporting a distinctive market offering, according to the localization requirements of its customer base.

⁶¹ South China Morning Post, “Nokia to set pace in digital convergence” adapted from the publication’s webpages. Available: <http://www.scmp.com/article/459618/nokia-set-pace-digital-convergence>, retrieved 17.7.2013

Nokia's supply network was well suited to producing and delivering hybrid devices – the product category of such converged devices remained a good fit with its collaborative business model – and supported the requirements of the product paradigm. At the time, Nokia's supply network key competence factors were found to be the efficient commercialization of sustaining innovations, physical manufacturing, the delivery of finished goods, and the utilization of economies of scale for cost efficiency. At the same time as creating demand for the new types of hybrid devices, Nokia was able to further capture market share by serving the emerging markets with the more traditional and simpler product offerings.

Disruption referred to as 'union of real life and virtual life' in Figure 27 is a landmark disruption coexisting with and through the increasing popularity of various virtual reality and social media applications. The consumers' requirements for an increase in their virtual presence and for the real-time sharing of information, status updates, photos and music has transformed the mobile industry. On one hand, it has created demand for different types of mobile devices and for a surrounding infrastructure that is capable of supporting it wherever and whenever through continuous connectivity and vast data transmission. On the other hand, it has simultaneously led to increasing mobile industry polarization between the emerging and emerged parts of the world, and for the key competence factors associated with the distinct product segments of feature phones and smart devices.

Apple iPhone is a prime example of a top-down disruptive innovation that was first brought into the high-end segment of the mobile smart device market but which has since steadily moved downward to overturn and define the mainstream smart device segment of the mobile industry (Carr 2005). The original technical specifications of the iPhone first launched in year 2007 were not drastically different from those which Nokia had to offer in its portfolio. However, by launching the product in conjunction with a business model that provided consumers access to third party applications, Apple was able to execute a blue ocean strategy that changed the dominant logic of the smart device mobile industry (Chesbrough 2007; Sabatier et al. 2012). That market entry was similar to Apple redefining the business for portable music players with its iPod (Carr 2005), the business model for the iPhone enabled the company to change the way consumers think of smart devices and transform the competitive key success factors from being about tangible product innovation to being about solutions.

Disruption augmented reality in Figure 27 is about providing socially relevant solutions that, through technology, combine a person's real- and virtual life for the various needs of end users. For the mobile industry it poses a requirement to effectively and simultaneously utilize device hardware, software and solution layers in anticipation of end user needs. Complex in nature, as well as dependent

on the high inter-operability of all the involved layers and infrastructure, augmented reality continues to transcend the boundaries of mobility from single devices towards a virtual user experience that is made possible through the use of myriad interconnected sensor technologies.

6.3.4 Market disruptions

Mobile market segmentation (referred to as ‘market segmentation to volume and value’ in Figure 27) has progressed alongside technological advancements in the industry. The increased purchasing power parity of many customers in emerging countries and the rapid rise of the middle-class in Eastern economies have created whole new markets for the mobile industry. At the same time, it has witnessed the emergence of new competition (see Figure 27) with low-cost, unique product offering. Associated with the overall transformation of the industry, including distinctive customer expectations regarding localized offerings as well as polarized market segmentation, both high-end and feature phones emphasize the need for cost-efficient and flexible production capacity.

The consolidation of the mobile industry (see Figure 27) has witnessed device manufacturers and suppliers alike consolidating under industry ecosystems and brands, with clear roles amongst business network participants according to their core competencies. However, it is significant that, in today’s consolidated mobile industry, many conglomerates assume different roles and accordingly belong and operate in multiple business networks and industry ecosystems.

For a long time, Nokia’s solution for cost efficient manufacturing and flexible operations seems to have been based on establishing large parts of its supply chain and manufacturing operations in Asia. The following figure provides an overview of the Nokia supply-chain transformation trends (Figure 31).

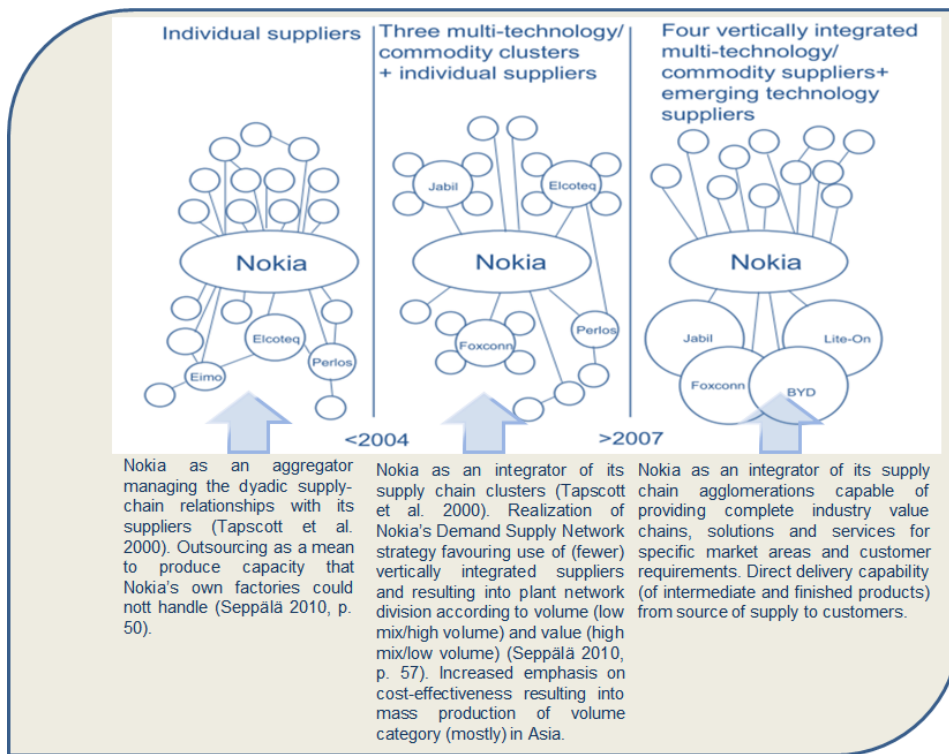


Figure 31 Nokia's supply chain strategy transformations from the perspective of Finnish suppliers (modified from Seppälä 2010, p. 45)

Figure 31 illustrates the transformation trends highlighted by Seppälä (2010). In addition, it deepens this discussion by also considering the changes in the roles of the suppliers in response to the requirements of distinct business models. Nokia's supply chain strategy has demonstrably driven its supply-base in a direction where it, in a static business relationship, operates with selected supply chain partners, who are expected to carry the responsibility for the day-to-day management of their respective supply chain management activities. The reach of the supply chain is designed globally, and its operations are established in a way that enables close customer proximity and the use of supply chain clusters in a cost efficient manner.

Within the researched timeframe the power distribution in Nokia's supply-base has demonstrated characteristics of unequal power distribution (Seppälä 2010). In the years of fast growth in the mobile industry, and relating to Nokia's earlier dominance within its industry, Nokia was able to assume the role of a forceful aggregator controlling the activities of its suppliers (Tapscott et al. 2000; Möller and Rajala 2007). It also, due to its size and market position, became a locus of concentrated buyer power representing a "major portion of industry revenues and growth" (Seppälä 2010, p. 38).

Seppälä (2010) analyzes the strategic and operative business behavior of the Finnish electronics subcontracting industry in his study and identifies distinctive transformation trends concerning Nokia's supply chain strategy. One of these transformation trends Seppälä (2010, p. 39) is the "globalization of the predominantly Finnish subcontracting industry".

For Finnish suppliers the mobile industry consolidation is summarized as having contained three distinct phases: First, the consolidation begun with the increased amount of supply capacity becoming available from Asian suppliers and contract electronic manufacturers for mobile products. Secondly, this extra capacity offering was then followed up by some of the existing Finnish suppliers moving their operations closer to the customer demand areas and the sources of supply. Thirdly, manufacturing operations followed this lead and increasingly became established in Asia (Seppälä 2010).

What then drove these consolidation phases can better be understood when considered from the viewpoint of increasing market demand, as expressed in terms of the combined volume of phones shipped (see Figure 27). Within the researched timeframe that has increased from approximately 150 million units to almost 500 million units. This increase in volumes, according to Seppälä (2010, p. 42), rendered it impossible for the Finnish supply-base to serve Nokia with the required technology and services, or to perform the necessary investments due to their lack of available capital. As a result, an increased amount of Nokia's supply capacity migrated outside of Finland, eventually reaching its current global form.

Another of Nokia's supply chain strategy transformation trends that Seppälä (2010, p. 39) identifies is described as "corporate strategic decision-making as part of the forced supplier clusters and regional agglomeration" 2004-2007 (Seppälä 2010, p. 39-40). Up until 2007 Nokia, through its dominant market position, was able to heavily influence the actions of its suppliers and increasingly drove its supply chain towards vertical integration and increased cost-competitiveness (Seppälä 2010). Many of Nokia's Finnish suppliers, in an attempted response to Nokia's targets, engaged in company transformations to establish a global presence and cost-efficiency, while some suppliers refused and lost their business with Nokia.

From a focal company perspective using a few, strong and reliable, vertically integrated suppliers helps to reduce the amount of touch points, and therefore simplifies the supply chain structure by minimizing the amount of required coordination, control and communication. Specialized clusters arranged according to specific technologies also simplifies the joint R&D as ready-made embodiments containing needed partners, knowledge and capital.

From the suppliers' perspective, acting as a supply chain integrator requires specialized skills and introduces risks. For a supplier to transform into an integrator requires investment and exposes the company to many risks in cases where its income is heavily dependent on only one customer, such as was the case with many of the Finnish suppliers.

Nokia's market driven approach towards partnering has perhaps not been the most encouraging for its suppliers to justify the investments and risks associated with their business operations with Nokia. This being highlighted through Nokia's manufacturing outsourcing strategy, emphasizing the suppliers' role in balancing the capacity that Nokia's own plants could not handle, and resulting in volatility for suppliers (Seppälä 2010, p. 50). Another example comes from 2008, when Nokia depicted its supplier portfolio strategy as metaphorically representing a Kiwi-bird, which signified the company's resolve to consolidate its supply-base to a few large suppliers and for the company not to drag along "a long tail of legacy suppliers" (Nokia DSNM Capital Market Day Presentation 2008)⁶². As such, these messages pertaining to the permanence of the business relationship may not have been enough to create or maintain trust in Nokia's business networks.

The demand and availability of ecosystem services and solutions (see Figure 27) has become one of the main criteria for customers making their mobile device purchase decision. With the growing user base and an abundance of potentially solvent new customers, various equipment manufacturers and solution developers are trying to exploit as well as create new business opportunities. Simultaneously, they are attracting even more customers, not only for their own benefit but, for the mobile business ecosystem as a whole. And, as is apparent from the quotes below, the attractiveness of the products a mobile ecosystem produces as well as the ecosystem offering as a whole, seems to have an impact on the perception, acceptance and subsequent customer purchase decision. Although the following quotes are from Internet message boards that do not bear academic merit, they do raise some interesting perceptions of the interplay between the mobile ecosystem offering and the success criteria for an individual product, and are therefore presented here:

"The problem is that there actually are not enough relevant Apps. Sure it [Nokia Lumia 700 using Windows Phone OS] might get "48 of the top 50" apps. But it does not have my bank app. It does not have my tax app. It does not have a bunch of apps I depend on.

⁶² Nokia presentation on 2008 Capital Markets Day 2008, "Demand Supply Network Management". Available: <http://i.nokia.com/blob/view/-/164754/data/3/-/8-Baril-Putkiranta-pdf.pdf>, retrieved 12.12.2013

Other people depend on other apps, most of which simply do not exist on WP. Until they get this sorted out, a score of '5' [out of 10] for [the whole Windows Phone] ecosystem is more than generous." (Unknown alias 'Amehaye' in the discussion section of The Verge, 2013)⁶³

"It seems Nokia's phones are made by engineers to engineers. They leave out the "user" in their user-interface and more so in the overall user experience. They either over-estimate or under-estimate the users, rarely getting it right... It's the Nokia-state-of-mind: populate the world with phones, and populate the phones with features (which you don't know exist let alone how to use unless you read the manual). They focus on making so many devices that they hardly ever get one right. The reason for the Nokia-state-of-mind comes of course from within the corporation, not from the end-users or what the market needs. Nokia should cut their product portfolio from the 100 (!) models currently on offer on their website to 20 models (or even less), and do those well in all aspects (UI, features, design, quality). But try telling that to the product managers (again engineers), who are so fond of their latest baby phones, and so driven by the internal corporate competition, that they do not care about what their customers want." (Anonymous commentator using the alias "Mesc" in discussion board of techcrunch.com, 2009)⁶⁴

Demand for sensing capable devices that deliver augmented reality⁶⁵ experiences is a disruption in the forming (see Figure 27). Navigation applications and other solutions providing virtual reality experiences for the customer have already been available for some time to consumers, but augmented reality seems to be the next big innovation in the making. As stated by Nokia: "Nokia's strategy is

⁶³ Taken from the discussion section of The Verge Nokia Lumia 720 review, <http://www.theverge.com/2013/4/16/4226108/nokia-lumia-720-review> (retrieved 17.4.2013)

⁶⁴ Taken from the discussion board of techcrunch.com. Available: <http://techcrunch.com/2009/05/26/nokia-ovi-store-launch-is-a-complete-disaster/>, retrieved 9.9.2013

⁶⁵ Merriam-Webster defines augmented reality as: "an enhanced version of reality created by the use of technology to overlay digital information on an image of something being viewed through a device (as a smartphone camera); also: the technology used to create augmented reality. (Taken from the webpages of Merriam-Webster, <http://www.merriam-webster.com/dictionary/augmented%20reality> (retrieved 28.8.2013))

about delivering great mobile products that sense the world.”⁶⁶ As the comments of both Nokia CEO Stephen Elop and Ogi Redzic imply, location-based services play a key role in Nokia’s business strategy, published in 2012:

“We are increasing our focus on the products and services that our consumers value most while continuing to invest in the innovation that has always defined Nokia... We intend to pursue an even more focused effort on Lumia [Nokia smartphone brand], continued innovation around our feature phones, while placing increased emphasis on our location-based services.”⁶⁷ Stephen Elop, President and CEO of Nokia Corporation, 2012

“In today’s increasingly mobile environment, we [Nokia] are on a mission to create a virtual index of the real world.”⁶⁸ Ogi Redzic, Vice President of Nokia Location & Commerce, Traffic, 2012

The significance of this disruption for Nokia’s business network is that its scope is heavily dependent on the services side, bundled with an indirect customer interface and value-creation logic and the offering expanding beyond the scope of the traditional device. An example being the “connected car” concept targeted at the automotive industry.

“Historically we’ve supplied content to the automotive industry – first maps and now traffic [Nokia HERE solution]... As more cars get connected we have the opportunity to move up the stack from a content player to a platform player to a services player... A car won’t just use a map to know its own location, but the location of the objects around it. Nokia is already overlaying that map with virtual information, which can not only be accessed by apps but can be projected into the field of vision through augmented reality technologies like Nokia’s City Lens. In short, maps are going to make the connected car go, and there are few companies that can

⁶⁶ Nokia press release “Nokia sharpens strategy and provides updates to its targets and outlook,” published 14 June 2012. Available: <http://press.nokia.com/2012/06/14/nokia-sharpens-strategy-and-provides-updates-to-its-targets-and-outlook/> (retrieved 28.8.2013)

⁶⁷ Nokia press release “Nokia sharpens strategy and provides updates to its targets and outlook,” 14 June 2012. Available: <http://press.nokia.com/2012/06/14/nokia-sharpens-strategy-and-provides-updates-to-its-targets-and-outlook/> (retrieved 28.8.2013)

⁶⁸ Release of the Office of the Mayor of the City of Chicago. Available: <http://www.cityofchicago.org/content/dam/city/depts/mayor/Press%20Room/Press%20Releases/2012/October/10.23.12nokia.pdf> (retrieved 28.8.2013)

deliver the map that Nokia can.⁶⁹” (Michael Halbherr, EVP Nokia HERE, 2013)

The significance of the social relevance that the mobile industry delivers to its surrounding world continues to be evident. Mobile companies have, throughout their history, contributed to the surrounding environment both purposefully and as a by-product. Today this market and customer purchasing parity inequality has become an important viewpoint for market differentiation, planning and execution.

For example, Nokia has realized the need to differentiate between developed and developing markets, as well as to try and influence the socio-economic disruptions caused by its own actions. This aim is understood as well as communicated in the company’s strategic targets for driving and delivering social change that is desired:

“At Nokia, we love the future – it’s what our strategy is all about. With our strategy, we aim to lead in sustainability for the people and the environment. With over 1.3 billion customers using Nokia devices, we’re in a unique position to effect positive environmental and social change around the world. For us, sustainability isn’t merely an exercise in damage limitation – it’s an opportunity to make a real difference, both to people and to our planet.”⁷⁰

On a global scale Nokia’s contributions towards bridging the connectivity and solution availability gap between developed and developing countries are especially noteworthy. A concrete strategic goal has been set to introduce the Internet to (an additional) billion new consumers in the growing markets and with an emphasis on developing countries⁷¹. This emphasizes the commitment of companies to shaping the lives of customers positively, but naturally not without financial incentives. The possibility to influence and shape the market demand of a billion potential new customers towards a company’s own offering and to lock consum-

⁶⁹Web article of Gigaom “Forget tablets. Nokia has a bigger connected gadget in mind: the car.” Available: <http://gigaom.com/2013/08/27/nokia-will-soon-get-into-the-connected-car-market/> (retrieved 28.8.2013)

⁷⁰“Strategy and reports”. Available <http://www.nokia.com/global/about-nokia/people-and-planet/strategy/strategy-and-reports/> (retrieved 19.2.2013)

⁷¹ “Seuraavan miljardin yhdistäminen.” (Connecting the next billion). Available: <http://www.nokia.com/fi-fi/tietoa-nokiasta/yritys/tietoa-meista/tietoa-meista/> (retrieved 3.1.2013)

ers in a desired ecosystem from the beginning of their mobile consumer journey is a real opportunity justifying the investments to be made.

In the more developed parts of the world, Nokia aims to drive innovation via various service assets and, essentially, by partnering others. In the developed markets, the continuous commercialization of both new as well as older ideas is the key to delighting customers and to making a profit.

6.3.5 *Regulatory disruptions*

Economic cycles and politics have and continue to be present in, and regulate the mobile industry. Standardization, as mentioned earlier, played a major role in the beginning of the mobile era, but has also been a barrier to its entry and a means of controlling and regulating the market in certain areas and countries.

Sandström (2010, p. 52-53) notes that disruptive innovations may be considered a business model problem as imposing changes on existing business models may be problematic and break the existing linkages between value creation and appropriation within the context of established value chains. At different times and in different geographical regions the role of network operators has played a varying role in the mobile ecosystem value creation logic (Bouwman et al. 2014). In earlier times, operators as intermediaries between customers and mobile manufacturers had a major stake in defining the allowable specifications for mobile operating systems and devices in order to protect their interests (Orlowski 2010). In countries, such as Finland, the operators' role in the mobile value chain was limited to the sales and management of the mobile subscriptions for a long time. Mobile devices were directly sold to consumers, who made their purchasing decisions based solely on market-driven factors, such as the availability and price of devices. As such, the influence and bargaining power of mobile operators over a device manufacturer's product portfolios were limited.

In other markets, such as China and the US, the operators have a dominant role in the mobile value chain. In China the government regulates the technologies and products sold within the country. In the US markets, the role of government is less visible, but the mobile operators exercise regulatory power over device manufacturers through various means. For example, operators typically sell devices to consumers bundled with fixed-term mobile subscriptions and hefty operator subsidies. Hence, through pricing the operators are able to lock-in consumers and to dictate the actual prices they pay for their mobile devices and their use. Many operators also insisted on manufacturers branding their devices under the operator's label, hence eating from the brand of the manufacturers themselves.

Such mechanisms enable mobile operators to have a say in both the products they, at any given time, allow into their sales channel, but also indirectly on the products that the manufacturers make and offer in the future. For example, the adoption of Wi-Fi technology was something that the operators dreaded for a long time due to their fear of Internet-based telephony and other forms of web-based communications. Hence, many phone models were delivered to certain markets without Wi-Fi functionalities. However, with modern smart phones being highly configurable, various third party applications are increasingly turning the operators into connectivity platforms.

6.3.6 *Results of the longitudinal contextual analysis*

Market discontinuities and disruptive technology innovations have fueled overall market volatility in terms of driving increasingly polarized customer requirements and product segmentation. At the same time, the entry barrier has been lowered. With increased competition and market volatility, the importance of cost efficiency and strategic flexibility (Rajala et al. 2012) have, for Nokia, become emphasized. Discontinuities and disruptions drive specialization in terms of competencies and capabilities associated with the delivery of localized customer offerings (Clemons et al. 1993). As such, focal companies and business networks must find ways to accommodate the changing requirements of both markets, and distinct business models by actively revisiting their collaborative strategies and the competencies at their disposal. For the focal companies of the business networks, the same issues have contributed towards the requirements to simultaneously utilize and operate under multiple collaborative arrangements, for example, various types of business networks and industry ecosystems.

In the developing markets, some of the key success factors are found in the overall supply chain management and manufacturing excellence of Nokia, which can optimally provide the needed economies of scale and bring needed competitive advantage via total cost leadership. In the emerged, often saturated, markets the competition becomes about harnessing innovations, revolutionary business models as well as products and services that win over consumers. Again, the supply chain plays a critical role here, but more from the viewpoint of securing supply through the correct partners at a needed time and with as little cost as possible. The key success factors for the high-end smart devices have become about harnessing, commercialization and the delivery of disruptive innovations.

The longitudinal contextual analysis of Nokia highlights the need the company has to excel in the utilization of its global supply chain and in the management of

its transaction network, which is designed around the needs of the product paradigm and the feature phone segment. However, Nokia's failure to transform itself and execute its high-end strategy change to become 'an internet company' quickly eroded its market dominance. Strategic actions as well as the financial and operational outcomes of Nokia lead to two conclusions. First, Nokia failed to harness the resources and competencies required to establish the needed co-creation network and associated innovation capabilities to reshape, respond and gain momentum in creating value for the consumers' needs under the solution and services paradigm.

Secondly, Nokia's vision for the high-end product segment was, for a long-time, built around innovations suiting the product paradigm. As such, Nokia failed to come up with and commercialize disruptive innovations of its own (Carr 2005; Govindarajan & Kopalle 2006). At the same time, competitors, such as Apple and the Android alliance, were able to introduce their blue ocean strategies, driving industry segmentation and entirely changing the type and nature of competition in the high-end segment of the mobile industry. The competitors' disruptive business models effectively harnessed the innovation capabilities of their co-creation networks to create customer value that was built around their intangible needs for solutions and services.

7 THE ROLE OF TECHNOLOGY IN FACILITATING CONGRUENCE IN COLLABORATIVE BUSINESS NETWORKS

This chapter approaches and addresses the third research question (RQ3) of this doctoral dissertation. In this chapter the concept of technology frames (Orlikowski & Gash 1994) and the process of framing (Davidsson 2006) are utilized as the lenses to empirically identify the role and use of technology to facilitate the creation of a company's collaborative business models. Empirically this chapter is based on and uses the information and insights gained through the comparison of the two distinct approaches that the investigated focal companies assumed for the creation of their collaborative business networks in the case research projects: Case N and Case M.

7.1 Method and limitations of analysis

This chapter makes use of certain methods and concepts that are based on the following idea: the process of strategizing (Håkansson & Ford 2002; Gadde et al. 2003) in the context of strategy and IT alignment correlates with the process of (technology) framing (c.f. Orlikowski & Gash 1994; Davidsson 2006; Kaplan 2008). In the context of inter-organizational networks and at different times of their lifecycles, the process of framing also serves as a method to find the necessary grounds for alignment (Davidsson 2006; Kaplan 2008), and as a tool to guide in the implementation of the collaborative business model – at all necessary levels of the network (Heikkilä et al. 2004; Heikkilä et al. 2010). These specified frame contents (Davidsson 2006) serve as a mechanism to reflect on the agreed and continuous congruence of companies during the implementation and execution phases of collaboration, and also identify further needs in, for example, alignment, resources or competencies (Heikkilä et al. 2010).

In this chapter multiple data sources of inquiry are utilized. First and foremost the empirical evidence of this chapter is based upon the observations of the distinct approaches the two focal companies in the earlier case research projects (Case N and Case M) assumed in order to realize their collaborative business

models with their selected suppliers and service providers, representing their partial supply chains, which were investigated as part of these two research projects.

Data collection methods included a web based survey questionnaire conducted as part of Case N, semi-structured theme interviews with both of the focal companies and their selected suppliers, and the notes and minutes of meetings, plus project reports created throughout the research projects. Both of the case research-projects and their data collection methods are described in detail in chapter 5.3.1 (Case N), and in Chapter 5.3.2 (Case M).

Secondly, earlier literature is utilized to provide the methodological framework and concepts for the comparison as well as to show the differences in the generic network typologies, and the impact of the distinct roles and position of actors within the context and execution of the collaborative business networks (Tapscott et al. 2000), and the differences these different network types and their nature constitute for the companies joint innovation capabilities (Valkokari et al. 2009).

It is important for the reader to note that the two case research projects serving as the source of empirical evidence in this doctoral dissertation both had distinct business objectives and scopes affecting the selected methods exercised as part of these studies. Furthermore, the researched industry of the focal company differs in each case. Due to the different research scopes and aims of the two research projects, Case N can, in general terms, be described as having generated more evidence, through semi-structured theme interviews, for the investigation of the role of technology in the creation of inter-organizational collaborative business models. For this reason, the role of Case N is emphasized.

7.2 Differences pertaining to the focal companies' network goals and their approach to establishing collaboration

The motives for collaboration and the benefits sought from their inter-organizational networks differed in the two case research projects. These differences are elaborated on next.

7.2.1 Goals and approach of focal company Buyer B in Case N

Buyer B (focal company in Case N) was mainly interested in strengthening its existing relationship and operations with selected suppliers. The selection of the focal company as a partner was based on the operative value and business outlook of the companies (Huhtinen et al. 2003), and targeted at improving the ICT supported collaborative Product Data Management capabilities for the manufac-

turing and delivery of goods under Buyer B's brand. The nature of Buyer B's collaborative business network can best be described as a transaction network (Valkokari et al. 2009).

Buyer B's supply chains and networks were observed to embed hierarchies (Ouchi 1980; Tapscott et al. 2000) that emphasized the dominant role of the focal company in the collaboration (Huhtinen et al. 2003). For the network participants, the intended collaborative business model imposed changes that impacted on their role, responsibilities and the way of working with and within the focal company and its other business network participants (Ibid.). As a result, some Buyer B suppliers (in Case N) were observed considering submitting to the focal company's requested implementations as a mandatory pre-requisite for the continuity of their business relationship with the focal company, rather than changing the collaboration to serve as a source of further competitive advantage (ibid.).

Buyer B's collaborative vision was, from the outset of our research project, already largely decided upon. As part of a larger sales and operations planning context, the associated technologies, information systems and business processes for the collaborative Product Data Management capability had been designed on top of Buyer B's enterprise architecture and embedded into its operative practices. Within the distinct Business Units (BU1⁷² and BU2⁷³) the nature and the maturity of the business required different capability requirements and key competencies, which also reflected the perceived priorities and needs for the collaborative Product Data Management capability (Huhtinen et al. 2003).

In generic terms, the collaborative Product Data Management capabilities of Buyer B meant that its suppliers had to assume more responsibility in the inter-company exchange between companies within the supply network. For some suppliers this meant a requirement to transform and extend their existing (dyadic) value chain type of business relationship so that it came to represent more of a network with reciprocal dependencies between the various tiers (Thompson 1967; Kumar & Van Dissel 1996). For some suppliers the requirements of the collaboration and committing to the focal company's processes were perceived as increasing their workload (Huhtinen et al. 2003).

⁷² Buyer B's Business Unit 1 was involved in the mass-manufacturing and delivery of consumer electronics. The product range of Business Unit 1 was wide and the production volumes high in quantity.

⁷³ Buyer B's Business Unit 2 was engaged in the project-based manufacturing and delivery of infrastructure solutions and services. Business environment of BU2 can be characterized as typically being about the delivery of moderate volumes for customer specific engineering.

7.2.2 Goals and approach of focal company in Case M

The focal Company in Case M, on the other hand, set its strategic objective as being to innovate and co-design with select service providers (as collaborative partners) to establish new collaborative business models for the fulfillment of the focal company's foreseeable and desired strategy targets. Collaboration in Case M emphasized the facilitating role of the focal company, whereas the structure and organization of the collaboration embraced the self-organizing nature of collaborative activities (Tapscott et al. 2000), and the voluntary role of the network partners in engaging in joint innovation processes concerning the collaborative business model (Heikkilä et al. 2002). The nature of the focal company network in Case M can therefore be best characterized as a co-creation network (Valkokari et al. 2009).

The focal company in Case M had identified a strategic need to establish a stronger presence in a new and emerging market area for its service-based business. This need, associated with the foreseen vast growth opportunities, served as the trigger for the company to become interested in assembling and involving itself in efforts to establish a collaborative network for this purpose. To succeed in penetrating the target market, the focal company had identified a requirement for it to build on top of its current service offering proposition and to localize it according to the needs of this novel market area.

At the time of the research project, the focal company's global presence and most of its knowledge base (expertise and competencies) – for its customers' paper-making machinery and associated manufacturing processes – were established in northern Europe (Heikkilä et al. 2002). In order to be able to deliver its localized offering in the target market, it was understood that the extensive use of ICT was required to bridge the gap between the customer and their needed technical support and knowledge (Heikkilä et al. 2002). For this purpose, the focal company realized it had to acquire external assistance from other companies to productize, offer, maintain and deliver its offering (ibid.).

To engage in the process of strategizing, the focal company committed to a six month long pre-study project to which some of the focal companies pre-selected service providers were also invited to participate – with the goal of joint co-creation. The facilitation of the pre-study was arranged by the use of a neutral party that, from a competitive viewpoint only, possessed an academic interest in the investigated subjects and business objectives of the collaborating parties.

The objectives for the pre-study were pragmatically approached. In the beginning of the project the focal company set the scene by illustrating its strategic vision and its requirements for forming the overall collaborative goals and context for the study. In the beginning of the project, the pre-study participants were expected to contribute to the setting of those detailed goals and viewpoints,

which then composed the detailed scope of the pre-study. At later phases of the pre-study, all the participants were expected to actively participate and contribute to the activities arranged by the facilitating party. Whereas the focal company did not issue any promises concerning future business prospects, all the involved parties gained access to the assembled knowledge documented in an unpublished pre-study report. (Heikkilä et al. 2002)

7.3 The role of technology and IT capabilities for the successful implementation of the collaborative business model

Buyer B had set objectives and targets that relied on the use and management of ICT for the execution and coordination of the collaborative efforts of the companies within the network. At the same time Buyer B's earlier attempts to implement its collaborative PDM system and related processes, for the purposes of communicating product relevant information during delivery, had proven unsuccessful. Within our Case N research project we hypothesized the possible role of technology and the effect that companies lacking technological capabilities and the technology itself had on contributing towards these earlier implementation failures. To investigate the matter further, the research consortia designed and conducted a web-based survey questionnaire designed to examine the role of the companies' current technological ability, and the related IT capabilities that the network participants played in the implementation's success.

Our research consortia hypothesized the survey questionnaire in order to examine the significant differences in the respondents' views concerning the grade of their IT equipment, and the associated competencies of their employees in using the IT for collaborative purposes. Furthermore, as our survey respondents were representing companies of various sizes, we were also expected to discover the size of the company⁷⁴ produced a significant variable illustrating the larger size of the company and its ability to correlate with both the increased grade of the IT equipment and the capabilities of their personnel to use these tools. In addition, it was predicted that the size of the company would correlate with their willingness to invest in the required IT systems and the development of their employees' competencies.

⁷⁴ In our web-based survey we categorized companies as either "large" or "SME" (Small and Medium Sized Enterprises) according to the following criteria: SME companies have less than 250 employees and a maximum turnover of 40 million Euros or a minimum sum of 27 Million Euros on their balance sheet. Companies with more employees and greater turnover are "large" companies (Vahtera 2002).

Against the expectations embedded in our hypotheses, the survey results (Heikkilä, Huhtinen, Kivistö, Tella, Vahtera & Virolainen 2003, p. 50–51) contradicted the correlation between the size of the company with the IT requirements (technical capabilities and the capabilities of personnel to use this technology) for networked collaboration. Furthermore, the survey illustrated that those companies participating in the survey questionnaire considered their prerequisites to be on a good level.

What our survey results revealed was that the position of individual companies in a business network affects the participants' views for adopting and implementing IS. These views included such decisions as justifying additional investments for the purposes of collaboration. We also identified most of the SME companies as underestimating the amount of change associated with networked collaboration, for example, the amount of investment needed for IT, education, re-engineering and for the required transformation to embed these changes into operations. Furthermore, this tendency seemed to grow in the networked collaboration the further away the respondent was positioned from the focal company (Vahtera 2002; Huhtinen et al. 2003).

To dig deeper into the phenomena and gain a better understanding of the factors influencing implementation success we then went on to perform our semi-structured theme interviews (these are explained in detail in Chapter 5.3.1). Our findings highlighted the reasons for Buyer B's earlier implementation failures as predominantly resulting from 1) too much emphasis and concentration being placed on the technical aspects when installing the IS and the associated processes required for collaborative PDM capability, and 2) that these installation targets were composed of excessively large implementation steps performed at an incorrect time by the Buyer B project group (Huhtinen et al. 2003, p. 53).

7.4 Identified frame incongruence in the differing views of the network participants

The role and position companies have in collaborative networks (Tapscott et al. 2000), and the nature and the type of the network typology in itself (Möller & Rajala 2007; Valkokari et al. 2009) affect the requirements for intra- and inter-organizational coordination (Heikkilä 2010), and the capability requirements of the collaborating companies individually and within a business network (Sainio et al. 2012). Furthermore, the motivation of the individual companies to engage, commit and execute according to the requirements of the collaboration is dependent on their joint activities to yield tangible benefits for the participants (Stenström- Iivarinen 2011).

Through the semi-structured theme interviews conducted as part of Case N significant differences pertaining to the expectations concerning the purpose and expectations of the implementation of the ICT supported collaborative PDM capabilities were identified. The analysis of the empirical data highlights the root causes for Buyer B's earlier implementation failure as stemming from an improper (process of) strategizing (Håkansson & Ford 2002; Gadde et al. 2003) within and amongst the network participants. The results of the failure of Buyer B's framing process were visible as information ambiguity (c.f. Kaplan 2008) within the focal company in itself and amongst its network partners (Huhtinen et al. 2003).

Our findings highlighted the importance of acknowledging the distinct views of the network participants – the views of the focal companies, suppliers and the collaborative business network as a whole – for the formation of collaborative business models. These differences were visible both within the focal company as well as within its supplier-base and will be introduced next.

7.4.1 Focal company views

The strategy vision for the implementation of the collaborative PDM capabilities was articulated by the senior executive responsible for the development and execution of Buyer B's global sourcing function. It was described as an enabler of an extended enterprise between the focal company and its select suppliers (Interview: 11/BU1 2002). The interviews with several Buyer B representatives, however, revealed this planned focal company strategy vision as differing when evaluated from the viewpoint of strategy as a pattern in a stream of actualized decisions (Mintzberg 1978).

Our interviews covered representation from multiple positions and ranks within Buyer B, including representation from the levels of the corporate hierarchy; from executive management to the persons operating directly in the supplier interface. Through these interviews, it was discovered that the focal company, both within and between the Business Units, lacked alignment concerning the content, realization and expected benefits of its collaborative Product Data Management capability (Interviews: 11/BU1 2002; 12/BU1 2002; 13BU1 2002; 21BU1 2002; 25BU2 2002; 27BU2 2002; 32BU2 2002; 33BU2 2002). Furthermore, the interviews highlighted the discrepancies between what the interviewees understood and how the interviewees understood the changes embedded during the implementation scope and what that signified for the focal company itself, its separate business units, and the execution of its collaborative operations with external

suppliers. As one of the interviewees remarked, the size and business prospects (in terms of volumes and profits) of the Buyer B's separate Business Units correlates with the Business Units' influence and power over their suppliers (Interview: 32/BU2 2002), which influences the distinct expectations concerning the Business Units' implementation scope.

Incongruences in the strategy frame of the focal company can be illustrated through the following example. One senior executive – responsible for the development and execution of the Buyer B's global sourcing-related activities – emphasized the strategic role of collaborative PDM capabilities in streamlining internal operations and processes between functions and aligning the execution of the focal company's operations with its suppliers (Interview 11/BU1 2002). This same senior executive also stated that having a collaborative PDM capability serves as an enabler for the buyer-supplier integration “as a platform... removing boundaries between organizations” (Interview: 11/BU1 2002). This extended enterprise vision was, however, contradicted by some of our other executive level interviewees, who not only displayed a lack of knowledge about the extended enterprise strategy, but furthermore stated that Buyer B lacked a coherent PDM vision (Interview: 12/BU1 2002), and that the concept of a collaborative PDM in itself was ambiguously defined and understood (Interview: 13/BU1 2002). One of our executive level interviewees went as far as to propose cancelling the implementation of Buyer B's collaborative PDM capabilities until the focal company was more internally aligned on the matter (Interview: 12/BU1 2002).

Many of our interviewees did not recognize the strategic dimension of the collaborative PDM capability at all, but voiced more pragmatic expectations about it. These interviewee expectations can be categorized according to their demonstrated view on estimating collaborative PDM capability as a means to 1) impose and enforce alignment, in other words to force collaborative partners to assume and submit to Buyer B's strategy and processes (Interview: 23/BU1 2002); 2) monitor and manage suppliers' compliance with Buyer B's processes and agreements (Interviews: 12/BU1 2002; 26/BU2 2002); 3) introduce Buyer B's internal process improvements for consistency, speed and flexibility, and to reduce the amount (and requirements) of internal work within the focal company (Interviews: 21/BU1 2002; 22/BU1 2002; 24/BU2); and 4) serve as a defined and controlled communications channel to ensure the required visibility between Buyer B and its supplier (Interviews: 13/BU1 2002; 31/BU1 2002; 32/BU2 2002; 25/BU2 2002; 33/BU2 2002; 34/BU2 2002).

7.4.2 *Supplier views*

Suppliers in general evaluated the intended network strategy of Buyer B as leading to complexity in their operations. In addition, suppliers feared the implementation as resulting in a way of working that placed more responsibility on them regarding supply chain management and the coordination of related activities. In particular, an increased workload was seen as resulting from the processes of component call-off and related communications activities in the lower tiers of the network and when dealing with the focal company. The amount of control was also anticipated as increasing for suppliers, resulting from the additional responsibilities for reporting being embedded into Buyer B's business processes, for example, in terms of responding to the focal company's frequent capacity confirmation requests, which fall under the suppliers' responsibility to perform (Huhtinen et al. 2003, p. 82).

At the time of the research project, Buyer B was actively seeking to establish closer partnerships with a few of its select suppliers. The actions of Buyer B to reduce the amount of suppliers and consolidate its supply-base was an openly communicated goal that the focal company expected to result in better commitment towards Buyer B from its suppliers as well as provide Buyer B with better control over its remaining supply-base (Interview: 32BU2 2002).

Decisions that Buyer B implemented concerning its supplier base and regarding the continuity of its business relationship with individual suppliers were carried out in terms of market-driven processes that forced suppliers to compete with one another. Such processes included 1) active contract management to lock-in needed suppliers to Buyer B's supplier network (Interview: 23BU1 2002); 2) a requirement for open book-keeping practices with suppliers in order for Buyer B to control the implementation of agreed prices and supplier compliance in a timely way (Interviews: 14BU2 2002; 27BU2 2002; 32BU2 2002); and 3) the active management of supplier splits to mitigate the focal company's availability risks by allocating its capacity needs within the supply-base and between complementing and competing suppliers (Interviews: 12BU1 2002; 32BU2 2002; 34BU2 2002).

Contract management was actively used as a mean to optimize the business value for Buyer B through the management of issues such as those concerning the overall length of the business relationship between the focal company and its suppliers, committing the supplier to Buyer B's business processes, and agreeing on the pricing mechanisms for the collaboration. As one interviewee of Buyer B stated "one of the challenges [concerning the making of contracts for component purchases] is how to get the best price without committing to any volumes" (In-

interview: 27/BU2 2002). Contracts also provided an incentive for suppliers to adopt and align with Buyer B's business processes portfolio because "if a supplier's strategy doesn't match with [Buyer B's] strategy, collaboration will not continue"⁷⁵ (Interview: 23/BU1 2002).

Supplier benchmarks were regularly held to maintain visibility in the supplier network and to ensure the suppliers' compliance with the defined business processes (Interviews: 27/BU2 2002; 28/BU2 2002). These benchmarks also added transparency to the overall capabilities of suppliers (Huhtinen et al. 2003). Open book-keeping practices partly served the same purposes of transparency and supplier ranking, but also helped to ensure that a supplier had introduced the agreed component prices (Interview: 27/BU2 2002).

Collaborating in Buyer B's business network was designed to be heavily dependent on accurate information being shared amongst the network partners. Furthermore, Buyer B had chosen to organize its business network in a manner where it forecast and shared predicted customer demand for all of its forecasting horizons with suppliers and all first tier suppliers (12BU1 2002; 24BU2 2002; 32BU2 2002; 3BU2 2002). The focal company making clear its demands were frequently communicated to suppliers to secure the timely availability of the materials required from their multiple suppliers. This design, however, also made the suppliers fully dependent on the stated demand for goods that the focal company provided – when describing its overall market requirements, and for suppliers to make their own capacity reservations from the, potentially multiple, tiers of suppliers below them in the supply chain.

The sharing of information within the Buyer B dominated business network resulted in a paradoxical situation. The interviewees demonstrated that both suppliers and the focal company were experiencing a fear of losing control when engaging in the networked collaboration. For the focal company, this fear was about losing the coordination of and control over the information in its supply network (and past its first tier supplier). The suppliers were concerned about the additional responsibilities they needed to assume and commit to within the business network when utilizing the demand requirements of Buyer B with the lower tiers of their networks (Huhtinen et al. 2003, p. 83).

As the demand visibility that Buyer B forecast was the only information source for suppliers preparing their own supply chains – and for the making of their own capacity reservations for the focal company's demand – the suppliers naturally placed high expectations on the accuracy of the forecast. However, the interviews highlighted some instances where the accuracy of this information was compromised, sometimes even purposefully, by the focal company for its

⁷⁵ In here the term "strategy" as used by interviewee 23/BU1 (2002) should be understood to pertain to the execution of operative business processes between the parties.

own operative reasons. Naturally, such action eroded the suppliers' perception of the accuracy of Buyer B's forecasts in the long run.

"In some circumstances [concerning the longer term forecasts used for capacity reservation purposes] we have, for certain components, forecast the total volume of the same component for two different suppliers ... this [for Buyer B] ensures capacity exists from two [supply nodes]" (12/BUI 2002).

Overall we noted the tendency for change resistance by suppliers to be emphasized for two reasons. Firstly, earlier unsuccessful attempts to implement Buyer B's collaborative PDM capabilities had mostly concentrated on its technical issues emphasizing the use of information for the coordination and steering of a network. As such, these implementation attempts failed to provide the suppliers with a broader strategic vision on the possible benefits of the collaborative arrangement. Secondly, the suppliers' earlier experiences of operating with Buyer B had demonstrated there was much room for improvement in the accuracy of Buyer B's capacity forecast (Huhtinen et al. 2003).

The interviews with Buyer B's suppliers demonstrated that the suppliers perceive their collaboration with Buyer B as providing business value, but that it also created anxiety and required tolerance due to a certain amount of operational uncertainty (ibid., p. 82). Whereas suppliers identified the attributed characteristics associated with closer cooperation as yielding value, for example, learning and efficient information sharing, they did not perceive Buyer B's implementation efforts to be delivering these benefits. The following quote describes a synthesis concerning the incongruence between the focal company's actions and the benefits perceived by its suppliers:

"[The] interviewed suppliers also emphasized the importance of the IOS [inter-organizational systems] community as a means of learning and exchanging experiences. Hence, they desire that the focal company puts more emphasis on the implementation process instead of concentrating merely on the design of the IOS. In practice, there is a need to make sense of and commit to the changes by 'muddling through' the design and implementation in a collaborative manner. It also might be beneficial to harmonize the internal processes, to some extent, in co-operation with the suppliers. The above findings clearly illustrate the reasons why companies may not be willing to join the network in the first place. Companies are

different, have different objectives for co-operation, and emphasize trust in relationships.” (Sissonen et al. 2006, p.8)

7.5 Results of the study

Buyer B had set forth to establish a business network with its suppliers. The goal for the collaboration, and for the collaborative business model, had been set by the focal company to represent that of an extended enterprise (Dyer 2000; Spekman & Davis 2004). The extended enterprise – as a networked innovation concept – is characterized as entailing the joint creation and sharing of competitive advantage amongst companies (Dyer 2000). It also views its participation as teaching organizations and trading knowledge as currency (Spekman & Davis 2004). The creation and utilization of shared innovation, embedded in business networks and their collaborative business models, requires an increased amount of openness and interaction from participating companies (Valkokari et al. 2009) and emphasizes that requirement in order for mutual benefit to be achieved by the network’s participants.

By typology and the network design, the planned collaboration within Buyer B’s network was to empower its participating suppliers to assume more responsibility over the collaborative operations in the execution of delivery process activities, whereas the focal company would assume the role of an integrator and control the customer interface. As such, the changes imposed by Buyer B can be seen as a step to move forward towards a value chain type of collaboration with ICT mediated reciprocal exchanges between its partners (Tapscott et al. 2000; Huhtinen et al. 2003).

Figure 32 illustrates the levels and gaps in the relevant frame specifications within the collaborative business model between the focal company, its suppliers, and the network as a whole.

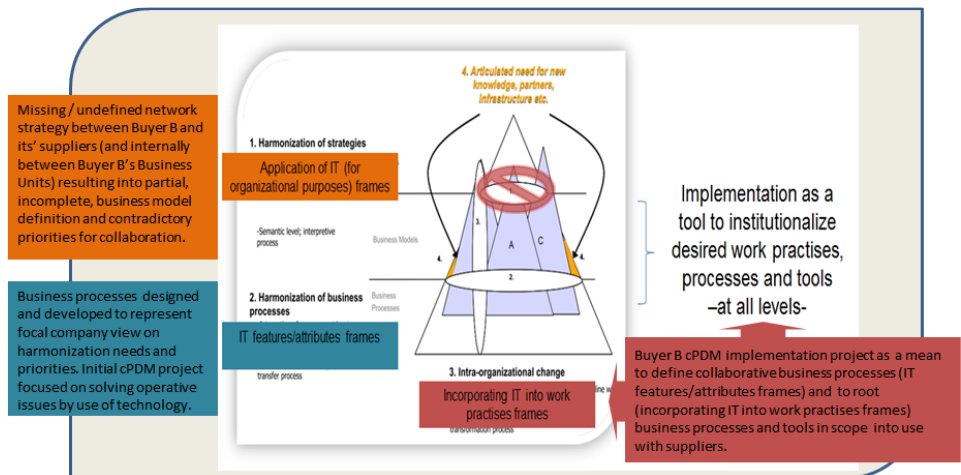


Figure 32 Technology frames and the framing process of Buyer B's business network (modified from Heikkilä et al. 2010)

Figure 32 describes the business network of Buyer B and its suppliers by evaluating the use of three technology frames relating to IT features and attributes: the application of IT frames, IT features and attribute frames, and the incorporation of IT into work practice frames (Davidsson 2006, p. 27). These frames are considered in a manner that enables the evaluation of the frame congruence at all appropriate levels of the network where the collaborative business model had to be implemented: at the level of the network, inter-organizationally in each dyadic relationship between the companies, and on the level of each individual company (Heikkilä et al. 2004; Heikkilä et al. 2010).

Case N study concluded that Buyer B both internally and between its business units as well as externally towards its suppliers lacked a holistic and shared strategy vision for its collaborative PDM capability (Huhtinen et al. 2003). In terms of technology frames this is highlighted in Figure 32 as a lack in the process of framing and the frame specifications concerning the organizational applications of IT within the collaborative context (Gadde et al. 2003; Davidson 2006; Kaplan 2008) at the network level.

Regarding the inter-organizational level of the collaborative business model, the specifications concerning the use of technology, its application, design, and use in conjunction with the collaborative business processes were primarily predetermined by Buyer B as the focal company of its network (Huhtinen et al. 2003). The partiality of these frame specifications, describing the IT features and attributes (Davidson 2006) required for the operative needs and priorities collaboration with the focal company, resulted in requirements for suppliers to adopt,

invest and commit to IT and business processes that did not necessarily agree with their own operative priorities (Huhtinen et al. 2003; Heikkilä et al. 2003, 2004).

For individual companies, the lack of a coherent and communicated collaborative business model that would link IT and the business process specifications to a generic collaborative strategy was realized as incongruence when trying to incorporate IT into work practices frames (Davidsson 2006). This increased information ambiguity resulted in a lack of trust amongst suppliers and in resistance to change, which meant that Buyer B's first attempts to root its collaborative PDM capabilities into its suppliers systems failed (Huhtinen et al. 2003).

8 DISCUSSION AND CONCLUSIONS

This chapter concludes the thesis by summarizing its findings and by providing topics for future research. The unit of analysis in this thesis has been the focal companies' collaborative business networks, and therefore the results of the study are presented in relation to them. The chapter begins with a brief recap of the research questions and approaches that form the basis of the study. At this time, the various sources of knowledge, including empirical case-research projects are also revisited. The chapter continues with an illustration of the points of conjunction that this study shares with relevant academic research domains. Within these domains some select academic discussions are then identified and discussed in order to present the contributions of this study within a larger academic framework. The theoretical and practical implications of the study are discussed next and each research question is answered in detail. The chapter concludes with considerations into the reliability and validity of the study and its findings, and some thoughts on topics for future research.

8.1 Restating the research questions

This thesis set forth to discover the reasons behind the perceived differences in the methods and results companies use, get and even exploit when encountering disruptions. The specific objectives of the research were narrowed down to the following three research questions:

- What is the importance of shared strategy in the creation and long-term sustainability of a collaborative business network?
- What are the types of disruptions that drive change, and how do those disruptions have an effect on the collaborative business networks within the investigated industries?
- How can technology be used to facilitate and agree on the necessary frame specifications for collaborative business networks?

The case-research strategy was selected as the primary method of research for answering the research questions. The sources of information for the research

were largely based on the combination of an in-depth literature analysis within the interrelated, contextual areas and on the observations and outcomes from the case research projects. Two of the three case research projects of this study were collaborative research initiatives between the university and the participating companies. These case-research projects have been referred to as Case Nokia (Case N) and Case Metso (Case M), and were introduced in detail in Chapter 5.

The third case-research project, Case N2, differed substantially from the other two case-research projects. This case was designed to systematically embed the author's own longitudinal, subjective, experiences and knowledge as a practitioner in the mobile industry into the study. Spanning the researched timeframe, the selected research approach for Case N2 followed that of the Reflective Information Systems Practitioner (RISP) approach (Heiskanen 1994; Heiskanen & Newman 1997).

To be able to systematically process all of the research material, the principles of interpretive field research (Klein & Myers 1999) were exercised. According to these seven principles, the individual case studies were contextually analyzed as independent hermeneutic circles and all the collected research materials were then consolidated for the generation of new knowledge. The use of these methods in conjunction with the longitudinal contextual analysis (Hassett & Paavilainen-Mäntymäki 2013) was demonstrated to yield value for the inquiry in order to describe and understand the process of change (Pettigrew 1990a; Christensen & Raynor 2003).

8.2 Conjunction points between the conducted study and earlier academic discussions

Specific focus was put on the investigation of the impact of disruptions on collaborative business models and inter-organizational networks. Interrelated contextual areas identified from the existing literature as streams of prior knowledge and inquiry included the following three domains; 1) collaborative business networks, 2) focal company strategy, and 3) disruptive innovation and collaborative business models. It is to these research domains that this thesis aims to contribute. Table 15 summarizes the themes, discussions, and contribution of this doctoral dissertation.

The research domain 'collaborative networks' related to academic discussions on the type, nature, mechanisms and embodiments various disruptions take as; 1) drivers of change (Christensen 1997; Chesbrough & Rosenbloom 2002; Bouwman et al. 2008; Chesbrough 2010; Doz & Kosonen 2013), 2) (disruptions) as change (Christensen & Raynor 2003; Markides 2006; Sandström 2010; Baiyere & Salmela 2013), and 3) (disruptions) in the shaping of the corporate busi-

ness environment, individual companies, networks, collaborations and the business logic of industries (Prahalad & Bettis 1995; Christensen & Raynor 2003; Ali-Yrkkö 2010; Sandström 2010; Sabatier et al. 2012). Within this domain the study makes two specific contributions that will be discussed next.

First, this study crosses over the existing contextual domains of inquiry and disciplinary boundaries through its use of research approaches and methodological principles, deriving from multiple sources of both theoretical and empirical evidence. The chosen methods increase understanding on the nature, process and drivers of change in their actual social context (Pettigrew 1987, 1990b). For the type of inquiry aiming to produce both managerial as well as theoretical contributions within the fragmented context of ‘network research’ (Möller & Rajala 2007; Teece 2010; Aspara et al. 2011a, 2011b), the value and usability of a research approach combining longitudinal contextual analysis (Pettigrew 1990a; Hassett & Paavilainen-Mäntymäki 2013) with the RISP approach (Heiskanen 1994; Heiskanen & Newman 1997) is successfully demonstrated.

Second, the findings suggest different network structures and the nature of the collaboration result in distinct expectations regarding the collaborative business model capabilities and the openness of the interaction of the companies. The network typology that a focal company selects for its business network affects the collaborative roles and interdependencies of companies. For participating companies these chosen network structures, or changes to an existing collaborative business model, may result in opportunities or threats that affect its individual strategies, financial situation or business models. The pragmatic conclusion this thesis makes implies the need for the focal companies of a network to acknowledge that these dependencies potentially influence the sustainability of their business network.

The second domain “disruptive innovation and collaborative business models” touched upon discussions on the interrelation between disruptions and the collaborative business models of companies (Chesbrough 2007; Rajala et al. 2012; Sainio et al. 2012; Doz & Kosonen 2013; Carayannis et al. 2014). The exploitation of networked innovation capability yields distinct requirements for collaborative business models (Christensen 2006; Bouwman et al. 2009; Sandström 2010; Teece 2010). Consequently, the level of business model openness and dependencies between participants must be managed by the focal company up to the level dictated by the nature, type, and objectives of the network (Heikkilä 2010). Due to the economic nature and responsibilities of the network participants as individual businesses, the collaborative business models need to be embedded with the required flexibility for acknowledging the participants’ role and value share, which results from the use and exploitation of their knowledge and

innovation capability as part of the collaboration (Osterwalder & Pigneur 2002; Bouwman et al. 2008; Chesbrough 2010).

The contribution of this study to the specific research domain takes place through the empirical comparison of the two distinct approaches the investigated focal companies assumed when establishing their business networks. Furthermore, these observations are considered in conjunction with an extensive longitudinal contextual analysis that examines the types and impact of disruptions that have affected the focal companies. As a result, the study provides considerations pertaining to the impact these different network creation mechanisms may have for the establishment of different types of business networks, and on the long-term sustainability of these different types of networked collaborations.

The research domain “focal company strategy” touched upon the discussions of 1) the essence and impact of strategy as a ‘plan’ or as a ‘pattern in a stream of decisions’ (Mintzberg 1978, 1979, 1983; Plourde 2013), 2) strategy and business model change in the operations of a company (Chesbrough 2003, 2007, 2010; Kim & Mauborgne 2006) and its interdependent business network (Bouwman et al. 2008, 2009; Sabatier et al. 2012; Doz & Kosonen 2013). Furthermore, specific discussions touching upon 4) the co-evolutionary relationship of the business model and its context (Tikkanen et al. 2005; Sandström 2010) paved the way for illustrating 5) the potential of disruptions to alter industrial environments, business models and the competitive positioning of companies within markets (Kim & Mauborgne 2006; Sabatier et al. 2012).

Continuing these discussions with the topics covering 6) technology frames (Orlikowski & Gash 1994) and the process of the(technology) framing of a company’s strategy and business model alignment (Gadde et al. 2003; Davidsson 2006) provided the necessary conceptualizations for describing the required levels of implementation for achieving business model congruence amongst collaborating companies. This study contributes to the focal company strategy research domain in three ways. First, the study provides a classification of those disruptions that have been identified as having had an effect on the investigated focal companies’ business models and inter-organizational supply management networks.

Second, through its empirical analysis the study draws upon the changes identified in order to describe the impact of disruptions in the investigated context as holistic change processes with visible impacts on both the focal companies’ strategies and on their business models. Third, the multi-disciplinary approach of this thesis is extended to combine the selected concepts of classical strategic management with some concepts and methods that may not be widely used outside of the academic discipline of ISS. As a result, the usability of the ‘technology frames’ concept (Orlikowski & Gash 1994) and the process of (technology) ‘framing’ (Davidsson 2006) for the joint ‘strategizing’ of companies (Gadde et

al. 2003) in establishing and managing collaborative business networks was demonstrated.

Table 15 Summary of the academic discussions on the intended contribution of the study

Contextual domains of Inquiry	Related academic discussions (non-exhaustive listing)	Contribution of the conducted study
Collaborative business networks	<p>Nature and essence of disruptions and change (Prahalad & Bettis 1995; Christensen 1997; Chesbrough & Rosenbloom 2002; Christensen & Raynor 2003; Markides 2006; Bouwman et al. 2008; Ali-Yrkkö 2010; Chesbrough 2010; Sandström 2010; Sabatier et al. 2012; Sainio et al. 2012; Doz & Kosonen 2013; Baijere & Salmela 2013); Longitudinal contextual analysis in the inquiry of organizational change (Pettigrew 1990a; Hassett & Paavilainen-Mäntymäki 2013); A model of the process of theory building on disruptions (Christensen 2006; Markides 2006); Fragmented or even missing theoretical foundations on collaborative business networks, business models, and strategy (Möller & Rajala 2007; Teece 2010; Aspara et al. 2011a, 2011b).</p>	<p>Literature analysis, empirical case evidence and reflective practitioner approach, illustrating the use and value of longitudinal contextual analysis as a method of inquiry aimed at describing change in its organizational setting and social context.</p> <p>Findings highlighting the collaborative business model structure and the nature of the collaboration as either a transaction network or as a co-creation network, and the impact on company's capability and willingness for business model transformation.</p>
Disruptive innovation and collaborative business models	<p>How collaborative networks and (open) business models may enable the successful commercialization of innovations (Chesbrough 2007); The role of strategic flexibility in the design of business models based upon open innovations (Rajala et al. 2012); Fast strategy (Doz & Kosonen 2013); Business model innovation and organizational sustainability (Carayannis et al. 2014).</p>	<p>Empirical comparison of the two distinct approaches that the investigated focal companies used for the establishment of their collaborative networks, regarding the scope of the empirical section of this work.</p> <p>Longitudinal contextual analysis on the perceived impact of the disruptions on the investigated focal companies.</p>
Focal company strategy	<p>Nature of strategy, strategy formation and the structure of organizations (Mintzberg 1978, 1979, 1983; Plourde 2013); Co-evolutionary relationship between the business model of a company and its context in driving business model transformation (Tikkanen et al. 2005; Sandström 2010); Blue ocean strategy (Kim & Mauborgne 2006); The relationships of the disruptions that drive change in the dominant logic of industries (Sabatier et al. 2012). Technology frames and the process of framing for strategy and business model alignment (Orlikowski & Gash 1994; Gadde et al. 2003; Davidsson 2006).</p>	<p>Classification of the disruptions that had an effect on the investigated focal companies' business models and their inter-organizational supply management networks.</p> <p>Illustration of the network phenomena as a holistic change process that influences the individual as well as the collaborative, strategies of the companies and their business models.</p> <p>Application of technology frames (Orlikowski & Gash 1994) and the process of framing (Davidsson 2006) for the implementation and evaluation of inter-organizational collaboration.</p>

8.3 Theoretical implications

With reference to studies aiming to examine strategic changes in the transformation of a firm, Pettigrew (1987, p. 664-665), concludes that 1) change is not a continuous incremental process, and 2) periods of radical change and incremental adjustment tend to precede one another. Pettigrew furthermore notes that 3) the environmental context, such as the economic climate, influences a decision-makers beliefs, and that these 4) cognitive changes are a factor in, and 5) precede the structural and business strategy changes of companies.

The longitudinal contextual analysis performed on Metso Paper and Nokia's devices business (see Chapter 6) illustrated the network phenomena as a change process from the focal company's viewpoint. As a result the analyses provided a classification for some of those disruptions that visibly had an impact on the focal company strategies and their business models.

The contextual longitudinal analysis, performed as part of this study, describes the identified changes within the investigated industries as being rather continuous. These changes cannot be described as being linear as they are sporadic. What this means in practice is that the analysis findings support Pettigrew (1987) in terms of noticeable times of strategic change followed by periods of seemingly less planned, reactive, changes to disruptive events. As such, the findings demonstrate, there is for applicable, interpretive and contextually aware longitudinal inquiry that studies 'change' (Pettigrew 1987, 1990a, 1990b). Similarly, as part of the combination of research approaches and sources of inquiry utilized as part of this thesis, the literature analysis, empirical case evidence and reflective practitioner approach are demonstrated to be suitable methods of inquiry for longitudinally investigating change in its context.

The analyses in Chapter 6 of this study illustrate the focal companies' cognitions, their expectations and foresight, which are reflected in their strategy execution. Similarly, disruptions were highlighted as affecting the strategies of the focal companies. For example, Nokia built its higher end product vision on the convergence of devices and selected associated services, whereas its smartphone strategy can be seen to have been affected by industry disruptions and its competitor's actions (Nokia annual report 2007, 2008; Orłowski 2010). Through contextual longitudinal analysis such examples become visible as deviations between the stated strategy and the realized strategy, which emerges from the identifiable patterns of strategy execution (Mintzberg 1978).

The multidisciplinary nature of economics highlights the research into networks, business models and strategy as benefiting from boundary breaking research across research fields (Heikkilä 2010). The evaluation of network partici-

pants as independent economic actors – with a specific focus on their nature, behavior, network roles, interdependencies – and actions, requires the social and economic context of the collaborating companies to be acknowledged. Of specific importance is emphasizing the shared and agreed strategy to govern and describe the joint efforts, value proposition and value share for all involved companies (Stenström-Iivarinen 2011). This study illustrates transaction networks and co-creation networks as the archetypes of two different types of networks, which have differing requirements in terms of the depth and abstraction of their collaborative strategy and business model alignment (Valkokari et al. 2009). Next the specific research questions are answered.

8.3.1 Research question 1

The first research question is:

Research Question 1 (RQ1): What is the importance of shared strategy in the creation and long-term sustainability of a collaborative business network?

This research question was approached from both theoretical and empirical angles. Theoretical considerations highlighted the dynamic and evolving role and nature of strategy (Mintzberg 1978; Håkansson & Ford 2002; Gadde et al. 2003; Kim & Mauborgne 2006; Doz & Kosonen 2013; Plourde 2013) and networks (Möller & Rajala 2007). Multiple viewpoints (as dimensions) of strategy (Kempainen & Vepsäläinen 2003) were then associated with the distinct elements of a collaborative business model (Osterwalder & Pigneur 2002; Bouwman et al. 2009) so as to illustrate the importance of the tangible economic business value (Stenström-Iivarinen 2011) in driving the considerations that individual companies and networks must address when engaging and committing to collaboration with one another.

Collaborative business models may be realized through various types of VCS structures (Ouchi 1980; Tapscott et al. 2000). However, it is important to note that the inherent nature, type, and typology of a network has an impact on the participants' roles and on the type of dependency that its participants share (Thompson 1967; Kumar & Van Dissel 1996). Therefore, different types of networks pose different requirements for its participating companies and also have an effect on the type and amount of coordination that the collaboration demands (Heikkilä 2010). Furthermore, some network typologies are better suited to certain purposes and uses than others, and hence the choice of companies pertains to

the structure under which, their collaborative business model is realized and which should reflect their needs and capabilities (Heikkilä et al. 2003, 2004; Valkokari et al. 2009).

This study approached collaborative business models and networks from two fundamentally different viewpoints on transaction networks and co-creation networks (Valkokari et al. 2009). In light of both the theory and empirical evidence, these network types differ in their associated, even inbuilt, level of ambiguity (Valkokari et al. 2009), their need for economic control (hierarchical or self-organizing), and on their consequent actor roles (Tapscott et al. 2000). Both have distinct capability requirements regarding the specific type of value integration that the utilization of the companies' shared networked innovation capability demands (Valkokari et al. 2009).

Transaction networks emphasize the role of the focal company as an intermediary, for example, as an 'aggregator' or 'integrator' (Tapscott et al. 2000), for its business network operations. As such, transaction networks can be said to inherently embed a hierarchy that highlights the role and responsibility of the focal company in terms of providing information, foresight, and direction within the collaboration. Thus, transaction networks are typically constructed to realize the focal company's strategy.

A shared collaborative strategy in the context of transaction networks correlates to a requirement for clear, concise and communicated specification requirements (as plans) that capture the intended value-creation logic for the collaborative parties (Mintzberg 1978). These specification requirements need to be strategized to the level of frame specification requirements (Orlikowski & Gash 1994; Davidsson 2006) that describe the required implementations on the distinct levels of the organizations, which are the planning level, architectural level, and implementation level (Heikkilä et al. 2010). In order to realize the collaborative business model these frame specifications must furthermore be available and implemented at the relevant levels of the network, amongst collaborative network partners and between individual dyadic relationships, and within each individual company participating in the collaboration (Heikkilä et al. 2003, 2006).

From an economic perspective, businesses strive to optimize the value they generate for their stakeholders. To be implemented in practice, the shared collaborative strategy in transaction networks should therefore acknowledge the individual participants as independent economic actors, and be constructed to acknowledge the tangible benefits of the collaboration for each of the network's participants (Stenström-Ivarinen 2011).

Empirical evidence from Case Nokia demonstrates how a fragmented and inconsistent focal company strategy may lead to an ambiguous strategy vision and

business model for the whole of a networked collaboration. As such, these weaknesses may end up limiting the collaborative capabilities of the companies and prevent the networked collaboration from reaching its intended potential. Consequently, the lack of aligned frame specifications for the different levels of an organization as well as the network partners, inevitably leads to misalignment between the planned strategy, IT and the aims of the collaborative parties. It may also result in a lack of commitment and the occurrence of other undesired socio-technical factors (c.f. Kumar & Van Dissel 1996; Heikkilä et al. 2009).

Co-creation networks are geared toward the exploitation of new knowledge and solutions to problems (Valkokari et al. 2009, p. 9). Similarly to transaction networks, they may embed hierarchies amongst actors and their value proposition may be constructed around the defined need of an actor or be dictated by markets and market dynamics. Co-creation networks, however, pose different kinds of requirements for the collaborative strategies of companies by placing the requirements for the tolerance of ambiguity on the network partners.

Furthermore, because companies as economic actors safeguard their intellectual property in the hope of future returns, the sharing of information in co-creation networks requires that the interests of the collaborating companies be aligned regarding the associated value share of their value proposition. In other words, co-creation networks require that their shared strategy and collaborative business model be defined and constructed in a manner that ensures there is no competition amongst its participants (Valkokari et al. 2009, p. 11).

The collaborative strategy of companies only pertains to the specific purposes described and defined as the collaborative business model of the companies. What this refers to is that collaborative business models must be managed and renewed if and when situations change, for example due to disruptions, or in cases where their intended value proposition changes.

The longitudinal contextual analysis of the two focal companies in their respective industries paints a picture of the source and impact of disruptions on their business models. In the analysis these disruptions were categorized under technology disruptions, market disruptions and regulatory disruptions (Bouwman et al. 2009). The longitudinal analysis demonstrated that the business models of both focal companies as well as their business networks have a lifecycle, and therefore they require renewal and management to be sustained and remain up-to-date.

The categorization of the disruptions from two industrial contexts highlights the following. Structural change in an industry creates new opportunities for companies in terms of enabling new types of business models and blue ocean strategies (Kim & Mauborgne 2006) to be designed and created. However, these same structural changes may equally render existing business models obsolete through the commoditization of technologies and increased competition. In the

context of Metso Paper, the analysis of the structural change in the industry was identified as being evolutionary. In other words, the focal company, for a long time, was able to foresee, identify and predict the ongoing changes within its industry, which it then used as requirements to renew its existing business model. As such, the nature of these structural disruptions allowed the focal company to make plans to react and take advantage of these changes.

The analysis of Nokia as a global device manufacturer painted another picture. Based on the publicly available empirical evidence presented in its annual reviews, the rapid segmentation and characteristics of the mobile industry into a distinct mobile phone market and an equally distinct smart phones market seems to have developed against the expectations of the focal company. The company seems to have anticipated the characteristics and the key competitive factors of the evolving mobile industry segments to have been something different than that which the markets molded it into. Whereas Nokia, for a long time, successfully drove the increasing convergence of devices (Doz & Kosonen 2013), the rise of service oriented mobile ecosystems as the blue ocean strategy of competitors seems to have come as a surprise (Kim & Mauborgne 2006). As a result, the company's earlier competitive advantages – based on its manufacturing excellence, global economies of scale, and global delivery capability – soon became exhausted and unusable for the growing Smart Devices market segment.

The changes in the industries, whether due to external disruptions, or a company's abilities to create and commercialize their innovative capabilities as sources of disruptions, highlights the need for companies to be able to operate in and with multiple value creation systems. Similarly, companies must be able to transform their existing collaborative business models rapidly according to changing market requirements.

8.3.2 Research question 2

The second research question is:

Research question 2 (RQ2): What are the types of disruptions that drive change, and how do those disruptions have an effect on the collaborative business networks with-in the investigated industries?

This research question was approached by means of a literature analysis and contextual longitudinal analysis extending over the operations of two focal companies within their industries. The literature analyses conducted as part of the

dissertation addressed and described the interrelation between the disruptions and the companies' strategy, business models, and business network design. An empirical analysis performed over an extended timeframe used both publicly available information as well as various findings from the case studies (Metso, Nokia, and N2). As a result of the empirical analysis, the visible discontinuities and strategic actions of the companies were identified; and classifications of the types of disruptions resulting in changes within their industries, strategies and the collaborative needs for external competencies and resources were made.

The findings of this doctoral dissertation support the findings of Sabatier et al. (2010), by demonstrating that the combination of a disruptive innovation and a change in a business model possesses the potential to inflict changes that transcend the dominant logics of industries. For example, consider the findings from the Metso Paper case study regarding the opening of the Chinese market and local government involvement giving access to and also creating new consumer segments and market demand, and the subsequent need for Metso Paper to co-create and utilize various types of new service innovations to stand out in its industry and maintain a competitive advantage over the emerging competition.

The second conclusion from the contextual longitudinal analysis highlights the combination of disruptive innovation and business model change to transcend the boundaries of the traditional product paradigm, especially for emerging industry rivals, by offering the possibility to reshape and redefine established markets and weaken the prior competitive advantages of established industry leaders (Kim & Mauborgne 2006 ; Chesbrough 2010). Some of these radical, disruptive changes in markets, technologies and governance result in discontinuities that give rise to whole new types of demand, customer and product segmentation, and even create new types of hybrid forms of established industries (Anderson & Tushman 1990; Sandström 2010). For example, consider the longitudinal contextual analysis for the Nokia devices case that illustrates the mechanism by which competitors such as Apple and Open Handset Alliance were able to combine a pre-existing innovation with a radical business model change to gain access to and to eventually end up redefining the high-end mobile market and its key competitive success factors.

Disruptions may have both positive and negative effects for the incumbent firms' existing collaborative business networks. Disruptions may create new market opportunities for various market and technological innovations and lower the entry barrier for new competitors. Furthermore, existing industrial ecosystems and business network disruptions may provide possibilities for various types of 'complements' (Brandenburger & Nalebuff 2011) in the form of complementing a product or service range, access to new product or consumer segments, or new types of value sources and revenue streams. As such, disruptions

may drive mutually beneficial and positive change within industries, and for various networks.

Disruptions may, however, equally have adverse effects on incumbent industries, firms, and business networks. In an evolutionary fashion, pre-existing innovations may, in time, render some companies' prior value creation logic, competitive advantages, existing capabilities and offerings obsolete. Likewise, disruptions may affect the competitive outlook of the incumbent network's focal company, and result in planned or realized strategy changes (Mintzberg 1978; Plourde 2013). Such changes in a focal company's network strategies may potentially lead to changing needs due to the use and usability of their various networks.

The commoditization of markets and technologies within industries has seemingly resulted in the increasing convergence of industries and increased the pace of innovations launched on the markets. Furthermore, associated with availability and advancements in infrastructures, the importance of providing intangible offerings built on top of tangible products has grown. For example, the importance of operating and maintaining services in the pulp and paper industry as demonstrated by the share of Metso Paper services sales within the investigated timeframe grew to represent around 40% of the company's total net sales (see Figure 24).

Subsequently, the importance of the service paradigm, and its associated capability requirements, in the creation and fulfillment of customer demand has increased in relation to the formerly dominant product paradigm. As such, many incumbent business networks originally built around predefined transactions and the tangible product needs of their focal companies now face limitations caused by their closed business model and the interdependencies of the participants. The blurred boundaries of the industries and the industrial ecosystems, which cross multiple traditional industrial domains, places an increasing emphasis on the need of strategically flexible business models to support the open innovation management needs of the collaborating companies (Hossain 2012; Rajala et al. 2012).

8.3.3 *Research question 3*

The third research question is:

Research Question 3 (RQ3): How can technology be used to facilitate and agree on the necessary frame specifications for collaborative business networks?

This research question was approached through the analysis of the knowledge gained and the observations made during the case research projects (Case Nokia and Case Metso), when the case companies were establishing their business networks with their selected participants. In the analysis, the focus was to understand the congruence of the collaborative parties' collaborative business model through technology and technology frames (Orlikowski & Gash 1994), which were the lenses through which the analysis was conducted.

Networks must be established at three levels: at the level of the collaborating companies, at the level of each dyadic (inter-organizational) relationship, and within each individual company (Heikkilä et al. 2003, 2006). Furthermore, in the context of each individual firm this implementation must be reflected at all levels of the organization: the planning, architectural, and implementation levels (Heikkilä et al. 2010). Misalignment between any one of these levels of the network or within an individual company may have an adverse effect on the collaboration as a whole (ibid.). Along the lines of Forsman & Nurminen (1994), the role and implementation of business processes and information systems has, in this doctoral dissertation, been seen as means to both structure and enable the collaborative networks of companies as social structures.

Technology frames (Orlikowski & Gash 1994) provide a useful tool with which to evaluate the understanding of people's interpretations and interactions with technology regarding IS implementations. In the context of collaborative business networks the same methods may be utilized to identify and address the factors affecting the implementation and congruence of the companies' collaborative business models. This thesis combined the concept of technology frames with the process of strategizing (Håkansson & Ford 2002; Gadde et al. 2003) in order to identify the need and importance of the relevant frame specifications (Davidsson 2006).

Through the process of framing, the possible incongruences between actors and the levels of an organization become identified. The process in itself may also serve as a tool for change management activities for the companies by providing the companies with possibilities to reduce information ambiguity (Kaplan 2008). For the operations of a collaborative business model, this process may also enable companies in the identification of complementary competencies or resources, or the potential sources of incongruence that require additional action (Heikkilä et al. 2010).

The alignment of three generic frame categories were investigated in the analysis conducted in this thesis. First, the frames related to information technology

(IT) features were connected to the level of the networked collaboration concerned with the harmonization of strategies for inter-organizational collaboration. Second, frames concerning IT features and attributes were connected to the network level for the harmonization of business processes. Third, frames concerning the incorporation of IT into work practices were evaluated from the viewpoint of the intra-organizational changes of individual companies. (Davidsson 2006)

Case Metso examined the follow-up of the actions the focal company initiated to form a co-creation network (Valkokari et al. 2009) with selected service providers. The goal of this pre-study was to identify the key success factors for the creation of a collaborative business model, whereas the ultimate motivation and business target of the focal company was to enable the fulfillment of its set strategy targets concerning the ICT supported delivery of services in an emerging market. For the service providers, the collaborative work on the design of the collaborative business model offered the possibility to get firsthand information on the perceptions and requirements of the focal company and its business targets. Naturally for the service providers, the collaboration could also provide possibilities for new or continuing business relations with the focal company and with its other service providers, however, these topics were not discussed as part of the research project.

Metso assumed that the creation of its collaborative business model (c.f. 'creation nets' by Brown & Hagel 2006) corresponded well to the concepts of business model 'experimenting' (Thomke 2002; Chesbrough 2010), and the 'modelling and mapping of value proposition' (Osterwalder & Pigneur 2003). As such, this case demonstrated how these processes of strategizing (Gadde et al. 2003) the relevant levels of a network enabled the participating companies to collaboratively work their way toward identifying the required (frame) specifications for their collaborative business model, and, in the process, address the actual and potential sources of frame incongruence (Davidsson 2006). The role of a facilitator, the research project group organized by the University of Jyväskylä in this case, as an unbiased link between the business actors was also demonstrated to yield value in the delivery of relevant information for the process of framing, and for the setting up of the necessary meeting and discussion structures for the collaborating companies.

The case highlighted the benefits of the collaborative process of strategizing (Gadde et al. 2003) for the framing of the required frame specifications (Davidsson 2006) and for the creation of the companies' collaborative business model. By assuming an open approach in which the focal company opened up parts of its own business strategy – pertaining to its future aspirations and the required business model and the encouraging of open communication amongst its select

partners – the companies were able to exploit their joint innovation capability (Valkokari et al. 2009). This approach enabled the participating companies to, in a trial and error type of way, engage in the joint work of common strategy creation and, through this strategizing, to create alignment between their own individual business models and the collaborative business model.

Buyer B organized its collaborative business network differently. As discussed earlier, many of the elements of the transaction networks regarding frame specifications were decided beforehand by Buyer B. As such, the collaborative vision and the capabilities of Buyer B represented its idea of the requirements for the collaboration. Rather than contributing to the design and creation of the collaborative processes through joint strategizing, the role of the suppliers in Buyer B's network became to commit to the network and carry out the necessary implementations of the architecture at the level of their company. As a result, ICT and the associated business processes for collaboration in Buyer B's network were seen, by some of the Buyer B network partners, as a way to lock them into the focal company's way of working. In many cases, this resulted in additional, and sometimes overlapping, investments and work for suppliers that may have more than one focal company to work with, each with their own different method and abilities for conducting business (Heikkilä et al. 2003, p. 47).

The approach – to the harnessing of joint capabilities for networked innovation in Buyer B's network – mostly resembled the concept of co-configuration (Victor & Boynton 1998), which emphasizes the learning and interaction of companies that occurs in the dyadic relationships between parties representing different traditions, expertise areas and social contexts (Engeström 2004). Instead of strategizing on the level of the network, Buyer B's focus was on the design and delivery of technological innovations to its own dominant logic, as embodied by its existing business model, resource allocations, and product portfolio (Prahalad & Bettis 1995). The potential downside to this approach in the words of Chesbrough (2010) being that:

“following ‘dominant logic’ can lead firms to miss potentially valuable uses of technology [which] do not fit their current business model.” (Chesbrough 2010, p. 359)

Evidence, such as that provided through the longitudinal contextual analysis in Chapter 6, seems to point to the fact that transaction networks encapsulated around a single focal company's vision and needs sometimes cannot comprehend and keep up with the magnitude and speed of the change in their industry, markets, and customer demands (Christensen 1997; Christensen & Raynor 2003). Disruptions act as catalysts in driving segmentation and creating markets and customer demand for totally new types of innovations and innovative offerings,

which highlights the need for economic actors to periodically review and renew their individual as well as their collaborative business models as well as the way their operations are tuned to deliver their offering. For such purposes, the process of framing – as a means to enable joint strategizing amongst the parties involved in a collaboration – serves as an excellent functional method and tool.

8.4 Practical implications

The practical implications of this thesis are presented twofold. First, by combining some of the existing knowledge – on the investigation of the impact of disruptions on collaborative business models and inter-organizational networks – new knowledge has been generated. This new knowledge may help practitioners, especially managers responsible for external business relationships with other companies and, for example, enterprise architects, to better prepare for and plan the necessary steps and internal processes for inter-organizational collaboration. Secondly, this doctoral dissertation has demonstrated the interrelatedness of strategizing and technology framing as processes that companies may opt to utilize when trying to reduce the incongruence of frame specifications, reduce information ambiguity and align their internal and collaborative strategies and business processes.

The process of joint and collaborative strategy framing for the collaborative network enabled the companies to learn in the process, created trust between parties, and enabled participants to commit to the created network strategy. As such, the process in itself functioned as a mechanism that, as a byproduct, yielded sociomaterial regulation as an outcome (de Vaujany, Fomin, Lyytinen & Haefliger 2013). The more accurately a shared business model strategy is defined when it governs the creation and actions of the companies, the deeper the socio-material regulation that can be embedded within the business process specifications. This ensures that the collaboration will function better and to some extent may reduce the need for coordination.

8.5 Limitations

For research to be scientific it must contribute to either existing theory or create a new theory (Koskinen et al. 2005). Networks and networked collaboration have been approached from various distinct viewpoints and studied within many fields of science (Möller & Rajala 2007). The differences in these academic fields'

philosophical standpoints, research methods, methodologies and units of analysis has contributed towards the accumulation of an existing body-of-knowledge, but also resulted in theoretical and conceptual fragmentation within the context of 'network research' (ibid.).

Some of this ambiguity has to do with the methodological standpoints, which link back to differences amongst different philosophies of science. For example, positivistic research on the use of ICT for networked collaboration may focus on the distinct quantifiable outcomes of using certain technology, but, due to its philosophical standpoints (Niiniluoto & Saarinen 2002), place little or no importance on the qualitative environmental and contextual factors surrounding their use.

Positivistic research consciously chooses to ignore qualitative aspects, such as the impact of a continuously changing environmental context (Niiniluoto & Saarinen 2002). The findings of such studies may, therefore, be considered scientifically pure, although difficult to relate to practice or generalize outside of the studied context (Evered & Louis 1981). Interpretivist research, focusing on the qualitative aspects and methods of inquiry, may provide contextually rich descriptions of the studied phenomena, but face similar challenges concerning the perceived validity and generalizability of the findings (McKinnon 1988; Koskinen et al. 2005; Lukka & Modell 2010). Probert (1997), argues against using polarizing positivistic or interpretivistic research methodologies (Burrell & Morgan 1979) and states the academic discipline of IS benefits from multidisciplinary, mixed methods of inquiry.

Issues concerning the validity and reliability of research are always present in scientific research. Therefore, for research to merit being called scientific and to enable the dissemination of the research findings a researcher should carefully manage and address the issues concerning the process and use of the various research methods utilized to yield the findings (Koskinen et al. 2005). In practice this requires the transparent and careful reporting of how the study was conducted and how its scientific methods acknowledged and addressed the issues of validity and reliability (McKinnon 1988).

Qualitative and interpretive studies share the handicap of their results potentially being difficult to reproduce in other contexts, such as other organizational or industrial environments (Klein & Myers 1999; Koskinen et al. 2005). This is also a limitation acknowledged by this thesis and remedied through means of systematic reporting and the use of the selected research approaches. Another handicap this work suffers from relates to various confidentiality and non-disclosure agreements pertaining to the use and reporting of some of the empirical evidence from Case M, Case N and Case N2. To mitigate this limitation, all necessary steps have been taken to present and utilize the available information in as transparent manner as possible. It is acknowledged that this limitation re-

quires an additional amount of trust be placed in the author of the thesis as the party responsible for selecting, analyzing, and presenting the results.

Empirical evidence collected for the case research projects was validated in the following manner. First, the accuracy of the semi-structured interview documentation was ensured through an approval process that had the interviewees review and approve the interview transcriptions. Secondly, before concluding the findings – including interviews and other sources of empirical evidence – the project group relied on the method of triangulation for inter-rater reliability (Armstrong, Gosling, Weinman & Marteau 1997). As such, decisions pertaining to the amount and saturation of information collected on any specific research theme was conducted within the project group “to establish the consistency of findings from and analysis conducted by two or more researchers” (*ibid.*, p, 598). If a research theme was evaluated as lacking evidence, then more interviews were arranged on that theme to reach satisfactory levels of saturation.

Findings from both of the case research projects were documented. All of these written documents were created and reviewed as a collaborative effort within the project group, and reviewed together with the operative stakeholders. Academic articles were written on the empirical evidence of these projects and were published after undergoing the process of scientific (blind) review. From a purely pragmatic viewpoint, the reception and feedback from the participating companies, demonstrated their desire to continue with the projects, which raised confidence concerning the validity of these research findings.

Pertaining to the use of applicative knowledge as a source of complementary value theory, Klein & Rowe (2008, p. 677) state the criteria for the professionally qualified doctoral student to be: 1) a minimum of 2-3 years’ worth of real work experience; 2) a supervisory or other higher work role; 3) an established and demonstrable record of accomplishment in their profession, and 4) intellectual and emotional maturity borne of advanced work experience, wherein the candidate is able to interpret situations and correctly assess solutions. As a prerequisite for the collection and utilization of knowledge – through means of the RISP approach, the above criteria can be concluded to have been met.

Lukka and Model (2010) present two approaches to the creation of necessary theory linkages to validate interpretive research findings. The first of these approaches relies on considering existing knowledge against the findings of the newly conducted interpretive research. The second approach relies more on the well-established theoretical base and aims to utilize the rich accounts of the interpretive research to contribute towards the creation of new knowledge. Both of these approaches have been relied on to validate the results of this study.

The use of the seven principles of interpretive field research (Klein & Myers 1999) enabled this work to be conducted in a manner that supports its validity and the relevance of its findings. First, following the principles of contextualization, the interaction between the researcher and the subjects, and the use of the hermeneutic circle allowed the scope of this thesis to be constructed in a manner that acknowledges the differences pertaining to its distinct sources and the use of empirical evidence. Second, by use of the principle of abstraction and generalization, the findings from these distinct hermeneutic circles were consolidated for further inquiry. Third, the principles of dialogical reasoning, multiple interpretations, and suspicion were exercised to create links between the theories and to validate the findings of the study. (Klein & Myers 1999)

8.6 Recommendations for further research

Topics for future research are presented next – with the author’s sincere hope that the work performed in this doctoral dissertation may inspire other academics to conduct further research within the context area.

This study evaluated the use of technology framing in a research project that was conducted some time ago and for which this method was not originally intended. To challenge the findings of this thesis and to realize new knowledge on the usability of technology framing as a tool for business modeling, it would be intriguing to see further results on the systematic and intended use of this process in inter-organizational contexts.

Another research topic would be to evaluate the realization of the network strategy in the course of the companies’ daily operative business. In other words, the role of research would be to examine if, and how, the shared networked business model ensures the fulfillment of the companies’ strategic targets, either consciously or unconsciously through its representation in the socio-material regulation inbuilt into the operative processes.

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