

Co-creation of integrated service solutions in business networks

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Preface

The doctoral studies and writing of this thesis has been an unforgettable, inspiring journey. However, a doctoral thesis is rarely the effort of one individual, but several actors contribute to the process. I would therefore like to express my gratitude to several individuals and organizations for their support on the course of this journey.

First, I wish to thank Professor Miia Martinsuo for guiding my doctoral thesis. The discussions with her at the beginning of the journey opened up the world of integrated solutions to me. After that, the 'theoretical fog', which I struggled in, started to clear. I am thankful for all the helpful feedback and encouragement all the way through. I would also like to thank Associate Professor Nicolette Lakemond and Professor Paul Matthyssens, the pre-examiners of the thesis, for their positive, encouraging feedback, and comments and suggestions, which helped me to improve and finalize the thesis. I will be honoured to have Professor Kirsimarja Blomqvist from Lappeenranta University of Technology as the opponent in the defence of my thesis.

I am deeply grateful to the co-authors of the original articles of this thesis: Adjunct Professor Elina Jaakkola, Principal Scientist Katri Valkokari and Research Scientist Minna Kansola. Elina Jaakkola provided the best possible 'course' on academic writing while we were co-creating the two articles of this thesis together. Working with her was extremely valuable and inspiring. Katri Valkokari has been my greatest support all the way since the beginning of the doctoral studies to the end. We have shared the same workroom and research topics for years and I have always been able to count on her support. Thanks also to Katri for commenting on several papers along the way. My compliments also go to the whole VersO and SOUL project team at VTT, Katri Valkokari, Minna Kansola and Tiina Valjakka, who attended to the data collection and analysis and enabled the successful execution of the projects with our customers. I also thank Elina Jaakkola and Helena Rusanen (Turku School of Economics) for attending to the data collection and Professor Aino Halinen-Kaila for her contribution in the VersO and SOUL projects.

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Senior Scientist Tapio Koivisto and Senior Advisor Matti Kokkala. Sometimes even a short discussion may increase motivation and provide new ideas to improve the work. Several of them also made an effort to obtain funding for this work. Last not but least, from VTT, I would like to express my gratitude to Senior Scientist Mervi Murtonen and Senior Scientist Eija Kupi. It was important to discuss all the aspects of this journey with them while also having fun. The best help in dealing with uncertainties was to share and discuss them with someone in the same situation.

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As there is so much more to life than work and doctoral studies, I would like to thank the people closest to me. They provided their support, love and relaxing leisure time as a counterbalance to writing this thesis. My parents-in-law, Leena and Reijo Hakanen, have been there for our family and as an invaluable help with our children. I want to thank my parents, Ulla and Arto Lehto, for providing the best foundation for my life. They have always encouraged me to choose my own path in life. Finally, I wish to express my gratitude to my loved ones, Teemu, Niilo and Touko. I thank Teemu for his support and for being the greatest husband and father to our adorable sons. Without everything being well at home, I would not have been able to finish this journey. Niilo and Touko, I hope you will find happiness and joy of learning in life.

In Tampere 19.12.2014

Taru Hakanen

Academic dissertation

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- Opponent Professor Kirsimarja Blomqvist
Lappeenranta University of Technology, Finland

List of publications

This thesis is based on the following original publications, which are referred to in the text as Articles I–IV. The original articles have been reproduced with kind permission from the publishers.

- I Jaakkola, Elina & Hakanen, Taru (2013). Value co-creation in solution networks. *Industrial Marketing Management*, 42(1), 47–58.
- II Hakanen, Taru & Jaakkola, Elina (2012). Co-creating customer-focused solutions within business networks: a service perspective. *Journal of Service Management*, 23(4), 593–611.
- III Hakanen, Taru (2014). Co-creating integrated solutions within business networks – The KAM team as knowledge integrator. *Industrial Marketing Management*, 43(7), 1195–1203.
- IV Hakanen, Taru; Kansola, Minna & Valkokari, Katri (2014). Acquiring customer knowledge to enhance servitization of industrial companies. In *Servitization in Industry* (pp. 191–209). Springer International Publishing.

Author's contributions

As the second author of Article I, I conceived the idea for the study. VersO and SOUL project team members attended to the data collection. The tentative framework was created, literature review and data analysis were conducted, paper was written and conclusions drawn in cooperation with Dr. Elina Jaakkola. The feedback from the two anonymous reviewers of Industrial Marketing Management influenced the final version of the paper.

As the first author of Article II, I conceived the idea for the study and conducted data analysis. VersO and SOUL project team members attended to the data collection. The tentative framework was created, literature review was conducted, paper was written and conclusions drawn by the author in cooperation with Dr. Elina Jaakkola. Feedback from the two anonymous reviewers of the Journal of Service Management influenced the final version of the paper.

As the only author of Article III, I conceived the idea for the study, conducted the literature review, planned the tentative framework, carried out the data analysis and wrote the paper. VersO and SOUL project team members attended to the data collection. The feedback from the two anonymous reviewers of Industrial Marketing Management influenced the final version of the paper.

As the first author of Article IV, I conceived the idea for the study, conducted the literature review and selected the theoretical background, carried out the data analysis with Minna Kansola and wrote the paper. VersO and SOUL project team members attended to the data collection. Dr. Katri Valkokari commented on the drafts of the paper and participated in formulating conclusions.

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1. Introduction

This thesis builds on the need to study integrated solutions from a service-centred view in business networks. This doctoral thesis consists of two parts. The first part presents an overview of the dissertation, which consists of introduction, theoretical background, methodology, results and conclusions chapters. The second part consists of the original articles on which this thesis is based. The following sections introduce the thesis, its aims and structure.

1.1 Background and motivation

Concentrating on core business and business customers' extensive needs, outsourcing and centralizing purchases have been prevalent trends in business during the past decades. At the same time, the importance of services and knowledge-intensive offerings has increased dramatically in the economy, attracting attention from practitioners and the academia. Service-dominant logic (SDL) (Lusch & Vargo, 2006; Vargo & Lusch, 2008) has described the change that is taking place in the economy and business regarding exchange of service as the fundamental concern of organizations, markets and society. SDL suggests shifting the mindset in business from goods-oriented thinking towards strong customer focus and the relational and collaborative nature of value co-creation. After all, services are intangible processes that require interaction between actors and customer participation in the process in order to create value for the actors involved (e.g. Edvardsson et al., 2005; Fitzsimmons & Fitzsimmons, 2008; Grönroos, 1990; Vargo & Lusch, 2004).

Developing integrated solutions offerings is one way for supplier companies to adapt to the widespread trends in business and the changes in customers' strategies, operations and needs. Integrated solutions are bundles of products and/or services that are customized to meet customer-specific needs and assumed to offer greater potential for value creation than the individual components alone (e.g. Brady et al., 2005; Davies et al., 2007; Nordin & Kowalkowski, 2010; Tuli et al., 2007). When a supplier aims to answer extensive customer needs or, for example, enter new markets, or develop new, innovative solutions, it may look for partners with complementing resources. Furthermore, in

the case of integrated service solutions, customer participation is pivotal for successful value co-creation. Integrated solutions are then not delivered from suppliers to the customer but *co-created* in interaction. As a result, supplier and customer companies integrate and apply their resources in interaction in business networks (Gummesson & Mele, 2010; Lusch & Vargo, 2006; Lusch et al., 2010). Thus, companies regard business relationships and resource integration as central sources of competitive advantage in solution business.

Previous solutions literature predominantly concentrates on studies conducted in manufacturing companies and the capital goods industry (e.g. Davies et al., 2007; Kapletia & Probert, 2010; Matthyssens & Vandenbempt, 2008; Oliva & Kallenberg, 2003; Sawhney, 2006; Windahl & Lakemond, 2010). In this context, systems integration is regarded as the core capability in bundling products and services (Brady et al., 2005; Davies, 2003; Davies et al., 2007). However, this thesis questions whether suppliers – in order to ensure their competitiveness – need to develop new kinds of capabilities, compared with the ones identified in earlier literature, when integrating *services* in business networks. After all, companies may struggle due to the intangible and knowledge-intensive nature of the offerings and the complexity caused by the business network context. The different logics of business, as well as the intangible, interactive and relational nature of services, may require new kinds of capabilities from companies on which the current solutions literature remains silent.

Despite the increasing importance of services and knowledge-intensive offerings in business, empirical research conducted exclusively within the service sector is only just emerging in the literature that deals with solutions (Aarikka-Stenroos & Jaakkola, 2012; Tuli et al., 2007). The previously identified capabilities in integrating solutions also do not take a strong customer perspective on solutions nor address the relationships and interactions between the customers and a set of suppliers within a business network (e.g. Brady et al., 2005; Brax & Jonsson, 2009; Davies, 2003; Davies et al., 2007; Shepherd & Ahmed, 2000; Skarp & Gadde, 2008; Storbacka, 2011). The co-creation aspect applied to this study, which emphasizes inter-organizational interaction and knowledge sharing among the network actors, may also have implications for the required capabilities. As a result, there is a need to increase conceptual understanding and provide in-depth empirical insight into the way integrated service solutions are co-created in business networks and what the central capabilities are related to the process.

1.2 The aims of the thesis

The main aim of this thesis is to identify the central capabilities and the related activities in the co-creation of integrated service solutions. In striving for the main aim, the study draws on the relational view of a firm and the selected theoretical perspectives taken on solutions co-creation, namely service management, value creation, knowledge management and key account management. Firstly, this

thesis aims to build a general conceptual understanding of how product-service bundles and integrated service solutions are co-created in business networks. Secondly, it aims to provide an in-depth empirical insight into how – through which activities – supplier companies co-create integrated service solutions in cooperation with their business customers in business networks. Thirdly, this thesis studies the phenomenon from the point of view of a supplier that operates as an integrating actor in the business network. Consequently, the study aims to identify the central capabilities required from an integrating supplier that co-creates service and knowledge-intensive integrated solutions with its partners and business customers in business networks. Although both industrial and knowledge-intensive business services are studied and conclusions drawn accordingly, the novelty value of this research is primarily built on the study of services that require thorough understanding of customer companies' businesses and needs, customization, extensive interaction among the actors and are based strongly on tacit knowledge. Tacit knowledge is regarded as knowledge that cannot be verbalized or formalized (Polanyi, 1966).

This thesis extends and complements the theory by applying various theoretical perspectives on networked solution business and by bringing deep empirical insight into the topic from different business fields. Through the results of the qualitative case studies of 30 companies and 101 in-depth interviews, this study contributes to the industrial marketing management literature and, in particular, to the literature concerning integrated solutions. This thesis contributes to the solutions literature by studying service solutions, which are in a striking minority in the domain (Aarikka-Stenroos & Jaakkola, 2012; Tuli et al., 2007), compared with the studies concerning product-service bundles (e.g. Davies et al., 2007; Kapletia & Probert, 2010; Matthyssens & Vandenbempt, 2008; Oliva & Kallenberg, 2003). This thesis also strengthens the customer focus in the solutions domain. The study thus contributes to the solutions literature by studying customers' perceptions as well as those of a set of suppliers at a time when such empirical observations are rare within the domain (Aarikka-Stenroos & Jaakkola, 2012; Brax & Jonsson, 2009; Skarp & Gadde, 2008; Tuli et al., 2007; Windahl & Lakemond, 2006). Consequently, this doctoral thesis complements the previously identified core capability of systems integration (Brady et al., 2005; Davies, 2003; Davies et al., 2007) in bundling products and services with the relational and interactive co-creation aspect of integrating services in business networks. This work therefore advances the shift from goods-dominant logic towards service-dominant logic (Lusch & Vargo, 2006; Vargo & Lusch, 2008) within the solution business domain.

Literature on solutions can be divided in the following research streams (Storbacka, 2011): servitization literature, solution marketing and sales literature, solution strategy and management literature, and operations management-oriented product-service systems (PSS) literature. This thesis contributes primarily to the solution management literature (e.g., Brady et al., 2005; Davies, 2004) and, secondly, to the solution marketing and sales literature (e.g. Cova & Salle, 2008; Tuli et al., 2007) because of the strong customer-focus around which this thesis is built.

This thesis contributes to the theory as well as the management of networked solution business in practice. By transferring and applying the findings of this study to business, companies are supported to become more customer focused – not only from a single firm’s perspective but also when collaborating with other suppliers. Thus, this thesis challenges companies to look at their own business, solutions offerings and customer relationships through the eyes of the customers. It encourages companies to open up the boundaries between companies, and to collect beneficial knowledge of the surrounding world and use it to improve their business competitiveness. Finally, this thesis supports solution business development by means of the presented managerial implications. To sum up, the results of this study support companies’ strategic decision-making in solution business, solutions sales and development, and customer relationship management. Companies may benefit from the results by improving their effectiveness in service solutions co-creation and fulfilling customer expectations for value and customer experience.

1.3 Research process and dissertation structure

This research started in autumn 2009 with the first data collection round and ended in spring 2014 with the writing of the introduction of this thesis. The research was conducted as part of two extensive service business research projects, VersO and SOUL. The focus of VersO – ‘Collaborate service development in networks’ – project (2009–2011) was on co-operation between suppliers, whereas the focus moved towards a stronger customer orientation in a business network context during the course of the SOUL – ‘Developing customer-focused solutions within service networks’ – project (2011–2013).

This dissertation is based on four articles, of which two were published in *Industrial Marketing Management* (Articles I and III) and one in the *Journal of Service Management* (Article II). Thus, the articles have gone through the blind review and revision process of the journals. Article IV was published in a book given out by Springer International Publishing. The authors of Article IV were invited by the book editors to contribute to the book. Three of the original articles were co-authored (Article I, II and IV) and one was written solely (Article III). Figure 1 presents the timeline of the research process of this thesis.

This thesis is organized as follows. Firstly, the Introduction chapter presents the background and aims and outlines the summaries of the original articles of this thesis. Secondly, theoretical background of the relational view of a firm, integrated solutions and business networks are presented. Then, the theoretical ‘lenses’ of service management, value creation, knowledge management and key account management, through which the phenomenon is investigated, are introduced. The Theory chapter provides a theory synthesis, identifies research gaps in the solutions literature and poses the research questions. Thirdly, the Methodology chapter shows how the research was conducted, and it assesses the quality of the research. Fourthly, the Results chapter summarizes the central results and contributions of the original articles. Finally, the Conclusions chapter presents the

discussion, the theoretical and managerial implications, the limitations of the study and suggestions for further research.

	2009	2010	2011	2012	2013	2014
Data collection						
Doctoral studies						
Article I						
Article II						
Article III						
Article IV						
Introduction						

Figure 1. Timeline of the research process (dark grey denotes the review process of the journal).

1.4 Outline of the original articles

The original articles of this thesis approach the co-creation of integrated solutions from several viewpoints. The first article, ‘Value co-creation in solution networks’, lays the foundation to this dissertation as a wider conceptual elaboration of the phenomenon of networked value creation in solution business. The second article ‘Co-creating customer-focused solutions within business networks: A service perspective’ discovers similarities between solutions and services and emphasizes customer focus on networked solutions co-creation. The third article ‘Co-creating integrated solutions – The KAM team as knowledge integrator’ identifies the importance of the KAM team in knowledge-intensive solution business. The fourth article ‘Acquiring customer knowledge to enhance servitization of industrial companies’ applies customer knowledge management in solution business. Next, the abstracts of the original articles are presented.

1.4.1 Value co-creation in solution networks

Despite high expectations attached to solution business, research on its value outcomes to the actors involved remains scarce. By drawing on rich empirical data, value research, and the interaction and network approach, this paper studies how value is co-created in solution networks. We explore how actors integrate resources in interaction to develop integrated solutions, and identify the related benefits and sacrifices perceived by each actor in two different solution networks. The study identifies potential linkages between the value processes of actors and their wider network, and postulates that the type of the resources integrated may be an antecedent to certain benefits and sacrifices. This paper contributes to solutions research by providing a new conceptual understanding of value co-creation that occurs in the interplay of actors, resources and activities in solution networks.

Keywords: Solutions, resource integration, value co-creation, b-to-b services, service network

1.4.2 Co-creating customer-focused solutions within business networks: a service perspective

Increased competition and more extensive customer needs have motivated companies to develop integrated solutions. In practice, companies struggle to co-create effective solutions that meet customer needs. The purpose of this paper is to identify critical factors affecting the effective co-creation of customer-focused solutions within business networks. The study investigates the co-creation of two different types of solution. Data were collected from two business networks comprising 13 companies, including suppliers and their customers. The empirical data comprise 51 interviews and observations made at 21 company workshops. The results show that effective co-creation of solutions requires a fit between the perceptions of multiple suppliers and their customers with regard to core content, operations and processes, customer experience and value of the solution. Co-creation is affected by, e.g. customer's preferences for participation and value, and the degree of competition, clarity of role division and rapport among the suppliers. Further empirical research is needed to examine how companies could overcome the problems identified, and reap the opportunities arising from the factors affecting the co-creation of solutions. As a practical implication, the paper presents a framework that outlines practical activities that help firms to reconcile the perspectives of different actors, and to facilitate the integration of resources when co-creating solutions within business networks. The paper contributes to the solutions literature by studying solutions as a network-level process of resource integration between multiple suppliers and their mutual customers, and by applying a service concept framework to the study of integrated solutions.

Keywords: Integrated solution, co-creation, service concept, business network, customers, business development

1.4.3 Co-creating integrated solutions within business networks: The KAM team as knowledge integrator

This study derives from a need that is both practical and theoretical: the need to increase knowledge of how KAM teams might ensure more successful value co-creation with their business customers in the service sector. The KAM teams in this study are formed of members originating from several supplier companies that integrate and apply resources with their customers in a business network. In the co-creation of integrated solutions within such business networks, KAM teams – drawing on organizational learning theory and knowledge management – are considered as knowledge integrators. The purpose of this study is to analyse the KAM teams' absorptive capacity – that is, how knowledge is acquired, assimilated, and applied in the co-creation of integrated solutions. The study employs a qualitative case study approach, based on 30 in-depth interviews in nine supplier companies operating in advertising, marketing and consulting, and in three key customer companies. The study contributes to the KAM literature by providing new conceptual understanding and empirical insight in respect of networked co-creation of integrated solutions and the influence of the KIBS context on the solutions process.

Keywords: Key account management, KAM, integrated solution, absorptive capacity, KIBS

1.4.4 Acquiring customer knowledge to enhance servitization of industrial companies

To enhance servitization of industrial companies there is a need for better understanding of why and how business customers purchase services. The purpose of this study is therefore to identify the factors affecting customers' service procurement. The study combines the theoretical bases of servitization, key account management and customer knowledge management. A qualitative exploratory research approach based on semi-structured interviews in both supplier and customer companies (n=47) was used. The study contributes to the servitization literature by suggesting that customer's outsourcing strategy, manufacturing technology, level of technological competency, procurement function structure, and expectations for benefits and customer experience significantly influence the procurement of services. We propose that acquiring in-depth customer-specific knowledge is key to increasing solution suppliers' customer orientation in servitization. The acquired customer knowledge offers a

basis for identifying customers of most strategic importance with regard to their service purchasing potential.

Keywords: Servitization, customer knowledge, service procurement

2. Theoretical background

The co-creation of integrated solutions in business networks is studied from several perspectives in this thesis. This chapter presents the theoretical background of the study, provides a theory synthesis, identifies research gaps in the solutions literature, and poses the research questions.

2.1 Relational view of a firm

The aim of providing supplier companies with research insight into the management of solution business serves as the starting point of this study. The perspective is on the supplier firm – how can it be more customer centric and gain a competitive advantage in solution business? The studied suppliers collaborate with other suppliers in this study as they strive to fulfil extensive customer needs. The study also includes a customers' perspective, with the aim of increasing customer focus of solutions research. Consequently, these aims motivate underpinning this study with the resource-based view of a firm (Penrose, 1959; Wernerfelt, 1984) and its extension, the relational view of a firm (Dyer & Singh, 1998).

According to the resource-based view of a firm, the basis of a competitive advantage of a company lies primarily in the heterogeneity of its resources compared with those of other companies. The competitive advantage then accrues from the application of valuable, rare, inimitable and non-substitutable resources (Barney, 1991; Wernerfelt, 1984). The primary sources of competitive advantage are certain human, technological, financial and intangible resources (Dyer & Singh, 1998). Amit and Schoemaker (1993) divide resources into resources and capabilities. In this respect, capabilities refer to “a company's capacity to deploy resources, usually in combination, using organizational processes, to affect a desired end” (Amit & Schoemaker, 1993). They regard capabilities as information-based, company-specific processes that develop through interactions between the resources. To emphasize the dynamic nature of markets and companies aiming to adapt to the changes, dynamic capabilities were introduced and defined as “the firm's ability to integrate, build, and reconfigure

internal and external competences to address rapidly changing environments” (Teece et al., 1997).

Drawing on the relational view of a firm, the focus is on business relationships between suppliers and between suppliers and their common customers. According to the relational view of a firm, companies’ critical resources may extend beyond company boundaries (Dyer & Singh, 1998). Inter-firm knowledge-sharing routines, complementary resource endowments and effective governance are then essential to gaining a competitive advantage. As is the case in this thesis, inter-firm linkages between supplier companies and with customer companies are regarded as central means to gaining a competitive advantage in solution business. Consequently, business networks are considered central units of analysis in this study.

In this thesis, knowledge is considered a central resource (cf. Grant, 1996a) in inter-organizational relationships. The importance of knowledge in terms of a company’s competitive advantage has gained wide interest from both practitioners and researchers (e.g. Grant, 1996a; Nonaka & Takeuchi, 1995). Several authors have emphasized the importance of inter-firm knowledge sharing (e.g. Ditillo, 2004; Galbraith, 1974; Grant, 1996b; Lane & Lubatkin, 1998; Sluyts et al., 2011). For example, Tushman and Nadler (1978) identified the increasing need for information processing capacity in companies as a result of work-related uncertainty and the need for increased amounts of information. Ritala et al. (2013), on the other hand, identified four key capabilities in ICT and consultancy: knowledge management, service productization, project management and relationship orchestration. They study the topic from a supplier and customer perspective at company level and emphasize, for example, the acquisition of customer knowledge in KIBS.

In addition to an intra-firm perspective, knowledge and knowledge sharing serve as a central means of gaining a competitive advantage also in business networks (e.g. Becker & Zirpoli, 2003; Berghman et al., 2012; Cohen & Levinthal, 1990; Dyer & Nobeoka, 2000; Grant & Baden-Fuller, 2004; Inemek & Matthyssens, 2013; Lane & Lubatkin, 1998; Möller & Svahn, 2004; Tsai, 2001). However, the striking majority of studies has been conducted in the industry focusing on, for example, new product development (NPD). In addition to the perspective of knowledge sharing, several authors have studied organizational integration and coordination in inter-organizational networks within the NPD context (e.g. Ettlé & Reza, 1992; Koufteros et al., 2005). Koufteros et al. (2005) studied internal and external integration and its influence on product innovation. However, studies on organizational integration and coordination in service business are rare in organization research (e.g. Jones et al., 1998; Syson & Perks, 2004). Syson and Perks (2004) studied the innovation process in business-to-customer financial services and Jones et al. (1998) in service constellations – alliances between multiple firms – that perform customized professional services. According to their study, difficulties in transferring tacit knowledge, for example, caused several challenges in business.

Despite the studies concerning the role of knowledge in service business, in-depth empirical elaborations at network level remain sparse, although certain authors have provided an empirical insight into knowledge sharing between companies also in service networks. For example, Evanschitzky et al. (2007) identified the knowledge management process and related challenges in knowledge-intensive service networks. In spite of the ample literature on knowledge utilization in business, further research is needed that combines the aspects of service- and knowledge-intensiveness of the offering and the business network context and, in particular, in solution business.

2.2 Integrated solutions

Concentrating on the core business and consequently outsourcing non-core operations has been a common trend in business-to-business markets over the past decades (e.g. Kakabadse & Kakabadse, 2002; Prahalad & Hamel, 1990). At the same time, the ongoing trend of centralizing purchases and reducing the number of suppliers has become widespread in the business world. As the extensive needs of business customers require a combination of different resources, they purchase integrated solutions.

Integrated solutions are an example of relatively broad and complex offerings that focus not only on technical integration but also on the total usage context (Nordin & Kowalkowski, 2010). Several, partly overlapping, terms are used in the solution literature to refer to an offering similar to an integrated solution, such as customer solutions (e.g. Tuli et al., 2007), turnkey solutions (e.g. Davies & Brady, 2000) and full service contracts as used in maintenance services (e.g. Stremersch et al., 2001). Due to its established position in solutions research and the focus on resource integration, this study relies on the concept of the integrated solution. By definition, integrated solutions are seamless bundles of products and/or services that meet customer-specific needs and offer greater potential for value creation than the individual components alone (e.g. Brady et al., 2005; Brax & Jonsson, 2009; Davies et al., 2007; Nordin & Kowalkowski, 2010; Tuli et al., 2007).

The definition of integrated solutions, and solutions literature in general, emphasizes customer orientation and long-term customer relationships. To satisfy customer needs, solutions are customized based on customer-specific needs (e.g. Miller et al., 2002). A central aim of integrated solutions is to bundle products and/or services so that the solution appears a seamless entity in the eyes of the customer (e.g. Brady et al., 2005; Brax & Jonsson, 2009; Davies, 2004). It requires integration of the solution components and coordination between different business units or companies (Davies, 2004; Davies et al., 2007; Storbacka, 2011; Tuli et al., 2007; Windahl & Lakemond, 2006). As a result, the solution solves customers' problems (e.g. Davies et al., 2007; Sawhney, 2006; Skarp & Gadde, 2008) and fulfils the customer's value expectations (e.g. Brady et al., 2005; Brax & Jonsson, 2009).

This study focuses on the co-creation of integrated solutions and approaches the complex offerings from an industrial marketing perspective. However, when broadly recapitulating, the research dealing with offerings similar to integrated solutions, complex products and systems (CoPS) (e.g. Davies & Brady, 2000; Hobday et al., 2005) and product-service systems (PSS) (e.g. Meier et al., 2010; Tukker, 2004) are close to and partly overlaps research streams with the integrated solutions domain. CoPS are high technology and high-value capital goods that are supplied to business users as one-off items or in small batches (Davies & Brady, 2000, p. 931). When capital goods are augmented with maintenance services, for example, bringing the long-term aspect into the offering, the offering extends into an integrated solution (Brax & Jonsson, 2009). CoPS and PSS literature are both highly product oriented, dealing with the question of how to increase the competitiveness of a firm by augmenting its product offerings with services. Contrary to the mainstream of CoPS and PSS literature, this study occupies a service- and customer-focused orientation to solutions. In fact, not all the solutions studied in this thesis include a product, and 'pure' service solutions are also studied. Thus, this study is conducted in the spirit of service-dominant logic (SDL) (Vargo & Lusch, 2004), which has its roots in marketing and promotes a strong focus on business customers, business relationships and value co-creation.

The literature on projects is also close to the domain of integrated solutions. A project is a temporary endeavour undertaken to create a unique product or service (Project Management Institute, 2000, p. 4). According to Cova and Salle (2007), the most significant attribute that differentiates solutions from projects, and from CoPS and other similar offerings, is the continuity of solutions. Supporting the view of Brax (2005), projects are then regarded as too transaction focused when services and long-term business relationships are emphasized in this study.

Solutions literature can be divided into several, partly overlapping, research streams. Prior literature has divided solutions literature into streams focusing on 'migration from products to solutions' and 'management of solutions' (Kapletia & Probert, 2010). Storbacka (2011), on the other hand, identifies the following research streams: servitization literature, solution marketing and sales literature, solution strategy and management literature, and operations management-oriented product/service systems literature. When recapitulating the studied offerings in the solutions literature, with a few exceptions that exclusively study services (e.g. Aarikka-Stenroos & Jaakkola, 2012; Tuli et al., 2007), most of the domain concerns bundling of products and services, especially in manufacturing and the capital goods industry (e.g. Davies et al., 2007; Kapletia & Probert, 2010; Matthyssens & Vandenbempt, 2008; Oliva & Kallenberg, 2003; Sawhney, 2006; Windahl & Lakemond, 2006, 2010). Thus, a significant proportion of the solutions literature concentrates on the servitization phenomenon and provides an insight into how to augment product-based offerings with services effectively and how to manage the related transition in companies. After all, the transition from 'products to solutions' requires not only the offering to be developed but also a shift in the nature of customer interaction from transaction based to relationship based (Oliva

& Kallenberg, 2003). In fact, during the past years, several studies have taken a more relational and interactive view of solutions instead of merely bundling the solution offerings (e.g. Tuli et al., 2007). Accordingly, this study applies the relational and interactive view of solutions co-creation in business networks – solution business based not only on the internal resources of companies but foremost on the integration of resources, inter-firm relationships and interaction between companies (cf. Dyer & Singh, 1998).

When analysing the units of analysis of the empirical studies in the solutions literature, it is noteworthy that the majority of the research relies on the data collected in supplier companies (e.g. Brady et al., 2005; Davies et al., 2006; Davies & Brady, 2000; Miller et al., 2002; Shepherd & Ahmed, 2000; Storbacka, 2011). The strong supplier focus in the empirical solutions research is surprising given the notion that customer focus is constantly emphasized within the solutions literature. Nonetheless, the customers' 'voice' remains weak within the domain. However, the number of empirical studies on supplier-customer dyads in solutions research has increased in the past few years (Aarikka-Stenroos & Jaakkola, 2012; Brax & Jonsson, 2009; Skarp & Gadde, 2008; Tuli et al., 2007). Tuli, Kohli and Bharadwaj (2007) proposed the application of a strong customer view on solutions based on the empirical evidence in service industries such as ICT, health care, real estate and financial service. They identified a major difference between the views of suppliers and customers on solutions – the extant literature and suppliers tend to have a product-centric view of customer solutions, while customers tend to have a relational view of solutions. The study then implies the importance of the development of relational capabilities in supplier-customer dyads.

Brax and Jonsson (2009) studied integrated solutions in the capital goods industry and concluded by emphasizing *seamless* integration of solutions. In line with Tuli et al. (2007), they proposed switching the perspective from the manufacturer to the customer's business and emphasized the need to learn more about the customer's strategy and processes. The supplier's capability for both internal and external integration in customer relationships is then pivotal. Skarp and Gadde (2008) remarked that continuous interactive problem solving is the key capability of a supplier in customer relationships. Although the study is based on the data collected in supplier-customer dyads, they concluded with a proposition emphasizing the roles of several actors in networked value co-creation. Furthermore, Aarikka-Stenroos and Jaakkola (2012) studied complex, knowledge-based and processual solution offerings in the service sector. They underpinned the study on value co-creation in KIBS and identified the activities in the joint problem-solving process between the supplier and the customer. Accordingly, problem solving can be regarded as a central capability in dyadic solution processes on the grounds of their study. Consequently, several articles provide interesting empirical insights into the customer's views on solutions in supplier-customer dyads. However, the way the customer perspective could be enhanced within a network context when several suppliers attend the solutions process remains an open question.

The studies on supplier customer dyads, but those conducted within a network context are also exceptional. Windahl and Lakemond (2006) analysed the interview data collected in supplier and customer companies in the capital goods industry and promoted customer focus within the network context. In addition to customer focus, they stress the importance of the relationships between the suppliers, research institutes and governmental agencies in the development of integrated solutions. In other words, they refer to a wider network of stakeholders, in addition to the companies within a business network. Finally, they contribute to the solutions literature by identifying the following factors as important when developing integrated solutions: the strength of the relationships between the different actors involved, the firm's position in the network, the firm's network horizon, the solution's impact on existing internal activities, the solution's impact on customers' core processes and external determinants. The understanding of the customers' business and processes and developing cooperation between the suppliers are then both addressed as important in networked solution business. Cova and Salle (2008) also conducted their study at network level by studying value co-creation in a business network. They expand the network perspective from a group of suppliers and their common customers to the customer and its network. The network perspective then reaches even further than the customer companies.

To sum up, despite the emergence of studies expanding the view from a single company to business dyads and networks, the mainstream of the solutions domain continues to concentrate on a perspective of single companies. There is a need to strengthen the relational and interactive view of solutions and to provide more empirical evidence on the way integrated solutions are co-created in business networks.

2.3 Business networks

The International Marketing and Purchasing (IMP) group has put forward some of the most established research on business networks. The industrial network approach (e.g. Ford & Mouzas, 2010; Håkansson & Snehota, 1995) builds on the ARA model, which depicts an industrial network as a set of business relationships connected through links between the *activities* conducted by the firms, ties between their *resources* and bonds between the *actors* (Håkansson & Snehota, 1995). Actors are individuals or, for example, companies, that perform activities and/or control resources (Håkansson & Johanson, 1992). Actors are connected by actor bonds, which are developed in interaction between the actors. Actor bonds describe the nature and strength of commitment in the relationships between the actors (Håkansson & Snehota, 1995). In other words, they describe the depth of cooperation and, for example, the perceived trust among the actors. Actors control resources, and activity occurs when actors combine, develop or create resources using other resources (Håkansson & Johanson, 1992). For example, Vargo and Lusch (2004) distinguish between operant and operand resources and their

emphasis is strongly on the operant, intangible resources (knowledge, skills, etc.) service being the basis of all exchange. When actors integrate and apply resources in interaction, new combinations emerge, as is the case with co-creating integrating solutions in business networks.

A company's position in a business network is a description of its portfolio of relationships and the rights and obligations that go with it (Johansson & Mattson, 1992; Turnbull et al., 1996). It describes how a company is linked to other companies. It is foremost of strategic importance to companies. When integrating solutions in business networks, one of the suppliers typically operates as an integrating actor responsible for resource integration through customer relationship management and managing the network of actors. As the aim of this thesis is to provide knowledge on how a supplier company can increase its competitiveness in networked solution business with its partners and customers, the focus is on companies operating as integrating suppliers. They are responsible for systems integration in solution business within the business network (cf. Davies et al., 2007).

In this study, a business network is defined as a set of actors, i.e. multiple suppliers and a common customer company that integrate and apply resources in interaction (cf. Gummesson & Mele, 2010; Lusch & Vargo, 2006; Lusch et al., 2010). Resource integration then results in the co-creation of a resource constellation (cf. Håkansson & Snehota, 1995) namely an integrated solution. As the border of any network is arbitrary and a network extends without limits through linked business relationships (Halinen & Törnroos, 2005), this study limits the study to the central actors co-creating integrated solutions in *intentionally* created (cf. Möller & Rajala, 2007) business networks.

Integrated solutions is an emerging topic of research in the IMP group. Similarly to the solutions domain, most of the empirical studies on solution business concentrate on single companies operating in manufacturing and the capital goods industry (Andersson & Wikner, 2004; Lakemond & Magnusson, 2005; Pekkarinen et al., 2008; Rabetino & Kohtamäki, 2013; Salonen & Jaakkola, 2013). Network-level studies on solution business are sparse (Salle et al., 2007; Oinonen & Ryyänen, 2013; Windahl & Lakemond, 2006) as are studies on services in solution business (Mäenpää et al., 2010; Pekkarinen et al., 2008). Nevertheless, research on integrated solutions is still in its infancy in the IMP domain, and the way services are co-created in business networks remains a topic that needs more conceptual and empirical elaboration.

2.4 Theoretical perspectives applied to solutions co-creation

This thesis builds on several theoretical perspectives, through which the co-creation of integrated solutions is studied. The theoretical perspectives were selected based on the aim of this thesis – to study how integrated *service* solutions are co-created in business networks and what are the required capabilities. Firstly, the interactive nature of solutions, strong customer focus and

the study, including 'pure' service solutions, motivates the selection of the service perspective in this study on integrated solutions. Secondly, this study builds on the presumption that the motivation behind co-creating integrated solutions in business networks is value co-creation – that is that the cooperation and the integrated solution accrue value for all the actors within the network. In other words, companies aim to gain a competitive advantage in networked solution business through successful value co-creation. Thus, value creation is selected as the second theoretical perspective through which the co-creation of integrated solutions is studied.

Thirdly, in addition to product-service bundles, this thesis studies solutions that comprise several knowledge-intensive business services (KIBS). Knowledge and knowledge management therefore serve as theoretical underpinnings of this study. Fourthly, this study identifies the central role of key account managers and key account management teams – KAM teams – in co-creating integrated solutions. They integrate resources between the suppliers and the customer company in a business network. Key account management is traditionally a way to enhance the customer focus in companies and strengthen business relationships. It supports the selected relational and interactive view of solutions in this study, and it is consequently selected as another theoretical point of departure. The following figure outlines the central perspectives of the original articles on which the thesis is based (Figure 2). Articles I and II provide empirical insights from the service management and value creation perspectives. Articles III and IV are based on knowledge management and key account management.

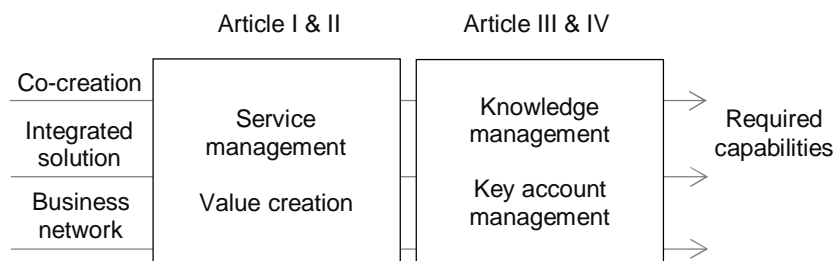


Figure 2. Theoretical perspectives applied in the thesis.

Next, the theoretical perspectives of service management, value creation, knowledge management and key account management are opened up in more detail and the research gaps within the solutions literature identified.

2.4.1 Service management and value creation

A service is a “time-perishable, intangible experience performed for customer acting in the role of co-producer” (Fitzsimmons & Fitzsimmons, 2008, p. 4). Another definition addresses a service as “an activity or series of activities of more or less intangible nature that normally, but not necessarily, take place in interactions between customer and service employees and/or physical resources or goods and/or systems of the service provider, which are provided as solutions to customer problems” (Grönroos, 1990). These definitions and the theoretical discussion on the concept of service in general emphasize the intangible and process nature of services as well as the interaction between actors and the benefits that the service accrues for the customer (e.g. Edvardsson et al., 2005; Grönroos, 1990; Vargo & Lusch, 2004).

When comparing products and integrated solutions, a notable difference is the service aspect involved in solutions. When product-oriented business is based primarily on transaction-based relationships, the literature on solution business emphasizes the development of long-term customer relationships and shifting from transaction-based business practices towards relational ones (e.g. Brax & Jonsson, 2009). Overall, the logic of solution business is rather different from the logic of product business as it involves customers more extensively and requires collaborative, cross-functional management practices (Storbacka, 2011). The interaction between the actors then increases similarly to that in services. To put it very strongly, whereas products are about functionality, solutions are about outcomes that make life easier or better for the client (Miller et al., 2002). In other words, instead of, for example, technical product features, the focus of solutions is on the outcome, the value that a solution enables the customer to create.

The solution process from ideation to implementation involves several phases, which entail a strong, in-built service aspect. Solutions are sold through solutions selling – a form of consultancy in which a thorough understanding of customer needs and business is acquired in ideating the optimal solution to customer needs. Solution selling enables the solution to be customized based on customer needs (Brady et al., 2005). The common problem-solving process in ideation and solution implementation between the supplier and customer representatives continues throughout the solutions process (Aarikka-Stenroos & Jaakkola, 2012; Sawhney, 2006; Skarp & Gadde, 2008). When bundling the components or service modules, a supplier provides ‘coordination service’ between several business units and companies, in the case of a business network. It is foremost a service, with a supplier company taking responsibility for integrating the solution and managing and coordinating the network of actors instead of the customer doing so. In many ways, a solution process consists of various, partly overlapping, services.

Arguably, solutions entail a strong intangible, interactive and relational nature compared with that of pure products. Several authors therefore characterize solutions as heterogeneous, intangible problem-solving processes (Brax & Jonsson, 2009; Davies et al., 2007; Sawhney, 2006; Skarp & Gadde, 2008). As a

result of their empirical investigation, which included supplier and customer perspectives, Tuli et al. (2007) concluded that the extant literature and suppliers tend to have a product-centric view of customer solutions while customers tend to have a relational view of solutions. Similarly, Storbacka (2011) considers solutions as processes rather than combinations of various goods, services and knowledge elements.

In line with the service perspective applied in this study, service-dominant logic (SDL) (Lusch & Vargo, 2006; Vargo & Lusch, 2008) serves as another theoretical point of departure or rather a 'mindset' guiding this study. SDL describes the ongoing change in the mindset concerning the purpose of economic activity. The main proposition of SDL is that exchange of service is the fundamental concern of organizations, markets and society (Vargo & Lusch, 2004). SDL challenges the goods-dominant logic, according to which the purpose of economic activity is to make and distribute units of output, preferably tangible (i.e. goods). According to the goods-dominant logic, the purpose of economic activity is to make and distribute goods. The goods are embedded with utility and value during production and distribution (Vargo & Lusch, 2004). Although goods- and service-dominant logics are often contradictory, in practice, product-based companies often balance and apply elements of both goods and service logics in their business (Windahl & Lakemond, 2010).

The service-centred view proposed in SDL is inherently customer oriented and relational. According to SDL, value creation is considered interactional and the customer is always a co-creator of value (Vargo & Lusch, 2008). In line with this, the research regarding solutions as relational, interactive and focusing on the customers' perspective implies that the solutions domain could benefit from SDL thinking. When applying SDL in the world of solutions and viewing solutions from a customer perspective, solutions can be regarded as service – sometimes the solution may also include a product or other tangible elements. A business customer primarily seeks support for its value creation and solutions to its problems – how this is achieved (with or without a product) is a secondary issue for the customer.

According to SDL, value co-creation refers to a collaborative effort rather than approaching value creation from a single actor's point of view. When integrated solutions are co-created within business networks, supplier and customer companies integrate and apply resources through interaction (cf. Gummesson & Mele, 2010; Lusch & Vargo, 2006; Lusch et al., 2010). As previous research has mainly looked at value from the customer's point of view (Songailiene et al., 2011), recent literature sees it from the point of view of each actor in the network (Gummesson & Mele, 2010). So far, value co-creation has primarily been addressed conceptually, and empirical research is only beginning to emerge in the area.

Consequently, the application of the SDL mindset and the prominent view of several actors' participation in value creation (Gummesson & Mele, 2010; Lusch & Vargo, 2006) motivate the use of the term *co-creation* in this study instead of the term *delivery*, i.e. solution delivery *from* suppliers *to* a customer. In this study, co-

creation refers to the interactive process in which actors – the suppliers and their customers – jointly create the solution offering by integrating and applying resources.

Co-production is a close concept to co-creation. The roots of the term co-production are mostly in public services, and the related research embraces the idea that citizens can play an active role in producing public goods and services. Then, co-production refers to “the process through which inputs used to produce a good or service are contributed by individuals who are not ‘in’ the same organization” (Ostrom & Baugh, 1973). Gallouj and Weinstein (1997) regard co-production as a central characteristic to services. They essentially refer to the operative interaction between service suppliers and customers and customer participation in the production of service. The term co-development is in use for example in service innovation literature emphasizing the integration of customers and learning with them as co-developers throughout the service innovation process (Edvardsson et al., 2010).

Despite the lack of conceptual clarity, this study applies the co-creation term for several reasons. By choosing the term, this thesis embraces the co-creation paradigm (Ramaswamy & Ozcan, 2014), which is about interactions between several actors, joint value creation, and utilization of a joint resource base. Co-creation is considered to contain the elements of both co-development and co-production, which are both in the focus of this thesis. After all, in solution business in KIBS, for instance, ideation and the implementation of the solution are at least partly overlapping processes and hard to separate. Solutions ideation, common problem solving and customization may go on throughout the solutions process. While co-production emphasizes operative interaction (Gallouj & Weinstein, 1997), the focus of the thesis is both on operative and strategic level of cooperation. The term co-creation also refers to acts of collective creativity (Sanders & Stappers, 2008), which is a further reason for its use in this study when, for example, marketing and advertising solutions are studied.

When analysing the relationship between the terms co-creation and value co-creation, both of which are used in this study, value co-creation always occurs when customers purchase solutions and perceive benefits from them, while co-creation is relatively optional (cf. Lusch & Vargo 2006; Vargo & Lusch, 2008). In other words, the intensity of interaction and the extent of common resource integration and application may vary in different solutions and contexts. The co-creation term applied in this study is linked to the process of the way the solution is ideated and implemented, while value co-creation relates to the way the co-creation process leads to accrued benefits for the actors involved.

However, the process of co-creation and value co-creation as a network-level activity both remain sparsely studied areas in the solutions literature. Given the increasing importance of service in the economy and integrated solutions, more knowledge is needed on how integrated solutions are co-created in business networks. Does the current solutions literature provide means and knowledge of the required capabilities in integrating service solutions or does a more service-intensive offering require different capabilities?

2.4.2 Knowledge management

The concept of knowledge has deserved extensive attention since the early history of science. Knowledge can be considered as facts, information and acquired skills or understanding of a subject (modified from Oxford Dictionaries). Knowledge can be viewed as an object, a state of mind, a process, a condition of having access to information or a capability (Alavi & Leidner, 2001). One commonly used categorization in knowledge management literature is the division of data (i.e. 'raw' numbers and facts), information (i.e. processed data), and knowledge (i.e. authenticated information) (Alavi & Leidner, 2001). A further distinction can be made between explicit and tacit knowledge (Polanyi, 1966) in terms of whether the knowledge is formal, codified or tacit – possessed by individuals and difficult to communicate to others through words and symbols. Gupta et al. (2000) suggested that knowledge management could improve the competitiveness of a company through a process of development, storage, retrieval and dissemination of information and expertise.

Various business-to-business services such as IT services; R&D services; technical consultancy; legal, financial and management consultancy; and marketing communications represent typical examples of knowledge-intensive business services (KIBS) (Toivonen, 2004, p. 31). KIBS are defined as services involving economic activities intended to result in the creation, accumulation or dissemination of knowledge (Miles et al., 1995, p. 18). They are characterized as relying heavily on professional knowledge and involving a high degree of interaction and problem solving with customers (Miles et al., 1995). The importance of knowledge in business corresponds to the value creation domain in which intangible resources are regarded as the fundamental source of competitive advantage (Vargo & Lusch, 2008). Similarly, the relational view of a firm (Dyer & Singh, 1998) identifies inter-firm knowledge-sharing routines as pivotal in gaining a competitive advantage. Likewise, in the solutions literature, business partners are encouraged to share information in an open, consultative and informal way (Brady et al., 2005). In addition to a single company or business dyad perspective, knowledge and knowledge utilization serve as a central means of gaining a competitive advantage also in business networks (e.g. Berghman et al., 2012; Dyer & Nobeoka, 2000; Inemek & Matthyssens, 2013; Lane & Lubatkin, 1998; Möller & Svahn, 2004).

Learning and the ability to share knowledge depend on companies' absorptive capacity, i.e. their ability to acquire, assimilate and apply knowledge (Cohen & Levinthal, 1990; Lane & Lubatkin, 1998; Zahra & George, 2002). Knowledge acquisition refers to a company's capability to identify and acquire critical, externally generated knowledge (Zahra & George, 2002). Assimilation of knowledge denotes the routines and processes in a company that lead to analysing, processing, interpreting and understanding the acquired information (Zahra & George, 2002). Finally, knowledge application refers to the way in which knowledge is used for commercial ends (Zahra & George, 2002).

Apart from a few exceptions (e.g. Aarikka-Stenroos & Jaakkola, 2012), studies exclusively conducted within the KIBS context are a rarity in the solutions domain. Nonetheless, the intangible service and knowledge-intensive element of solutions may affect solution co-creation in several ways on which the current literature remains silent. At the same time, companies may struggle in effective knowledge acquisition and utilization in business development. Thus, the understanding of integrating knowledge-intensive solutions is in its infancy and the knowledge of the required capabilities is yet to be uncovered.

2.4.3 Key account management

Key account management can be considered a natural development of customer focus and relationship marketing in business-to-business markets (McDonald et al., 1997). Key account management is preoccupied with the systematic selection, analysis and management of the most important current and potential customers (Zupancic, 2008). The most common selection criteria for strategically important key customers are sales volume, profitability and length of relationship (McDonald et al., 1997; Ojasalo, 2001). By definition, the KAM approach adopted by a supplier company aims to build a portfolio of loyal key accounts by offering, on a continuing basis, product/service packages tailored to customers' individual needs (McDonald et al., 1997; Millman, 1996). KAM has been studied from several perspectives, such as: reasons for adopting KAM, selection of key accounts, elements of a KAM program, role and characteristics of key account managers, organizing for KAM, adaptation of KAM approaches, team selling, customer relationships, global account management and success factors in KAM (Guesalaga & Johnston, 2010).

Key account managers and KAM teams clearly have a central role in increasing a supplier's customer centricity and in co-creating integrated solutions among supplier and customer companies. The key account managers and KAM teams analyse customers and understand their businesses and needs. They are in a central position with regard to acquiring and communicating customer knowledge to the others in their representative organization. Thus, they are in a central role with regard to customer knowledge management (e.g. García-Murillo & Annabi, 2002; Gebert et al., 2003; Gibbert et al., 2002; Salojärvi et al., 2010; Salomann et al., 2005). The key account manager, in particular, is responsible for conducting the "orchestra" of actors (Hutt & Walker, 2006; McDonald et al., 1997; Millman, 1996; Nätti et al., 2006) operating in the boundary-spanning role between the suppliers and the customer (Guenzi et al., 2007; McDonald et al., 1997; Nätti et al., 2006; Wilson & Millman, 2003). Consequently, they integrate and apply resources of several actors in interaction (cf. Gummesson & Mele, 2010; Lusch et al., 2010) when they search for a fit between the customer's needs and the solutions offering. When positioning solutions as inherently service and customer oriented and studying KIBS solutions in addition to product-service bundles, KAM

teams occupy a central role in integrating intangible resources (i.e. knowledge and other resources) utilized in solution business.

The provision of integrated solutions and the application of the KAM approach are based on the same trend of business customers seeking increasingly comprehensive solutions (e.g. Matthyssens & Vandenbempt, 2008; Skarp & Gadde, 2008) and, simultaneously, centralizing their purchases and rationalizing their supply base (Millman & Wilson, 1995). KAM teams then operate in a central role, when several products and services need to be bundled to fulfil customer's extensive needs. The KAM approach also allows customers to purchase integrated solutions with a 'one-stop shop' principle. KAM literature stresses long-term customer relationships, deep understanding of customer needs, common problem solving, customization of the solution, integration and coordination across organizational boundaries, and creation of synergistic value for the customer (McDonald et al., 1997; Millman, 1996; Millman & Wilson, 1996; Ojasalo, 2001; Wilson & Millman, 2003; Workman et al., 2003) resonating with the literature on solutions. However, the challenge is how the KAM approach could be developed to function in a more effective and useful way in order to increase competitiveness in the solution business. After all, the KAM organization may face practical problems in terms of integrating the solution across the intra- or inter-organizational 'silos' and adjusting the integrated solution based on customer needs.

Despite several overlaps between the solutions and the KAM literature, the domains of KAM and integrated solutions have not intertwined in previous research. As the KAM approach is undoubtedly commonplace in companies across industries that operate with a solution business model, there is no empirical insight into how the KAM approach could support companies in managing solution business. The key account managers and KAM teams may have a central role in increasing customer focus, promoting the SDL spirit and succeeding in service- and knowledge-intensive solution business. The role of KAM teams in co-creating integrated solutions in business networks and enhancing customer centricity of the supplier companies needs to be studied in more depth.

2.5 Synthesis

2.5.1 Research gaps in the solutions literature

The literature review demonstrates that prior literature on integrated solutions has concentrated on product-service bundles (e.g. Davies et al., 2007; Kapletia & Probert, 2010; Matthyssens & Vandenbempt, 2008; Oliva & Kallenberg, 2003) leaving service solutions as a striking minority (Aarikka-Stenroos & Jaakkola, 2012; Tuli et al., 2007). However, the intangible, interactive and relational nature of services may have an impact on the co-creation of integrated solutions in business networks, of which the current solutions literature remains silent. Although solution business is regarded as inherently customer focused, a clear minority of the empirical studies essentially analyses customer data and the way

the customer perceives the solution offerings (Aarikka-Stenroos & Jaakkola, 2012; Brax & Jonsson, 2009; Skarp & Gadde, 2008; Tuli et al., 2007). Studies that provide empirical evidence in business networks, including the supplier and customer perspectives, are also a rarity (Windahl & Lakemond, 2006). Furthermore, solutions literature refrains from providing empirical knowledge with regard to the role of knowledge in solution offerings as well as the role of KAM teams in networked solution business.

To sum up, solutions comprising various services – including knowledge-intensive business services (KIBS) – represent intangible and complex offerings. The context, in which the solutions are co-created, i.e. business networks, increases the complexity of the phenomenon compared with a single company's solution business. As a consequence, companies may struggle in managing the solution business in the case of such complex offerings and contexts. Nevertheless, the current literature is scant in terms of providing theoretical knowledge of the required capabilities and practical examples of how companies manage such solution business in practice. There is therefore a lack of knowledge regarding the required capabilities in the co-creation of integrated service solutions in business networks. Arguably, when combining the service- and knowledge-intensiveness of solutions and their co-creation in business networks, gaining a competitive advantage in solution business may require the acquisition of new kinds of capabilities or at least the re-configuration of existing ones. This study concentrates on identifying those capabilities based on the four original articles of this thesis. The following table summarizes the current solutions literature concerning the identified capabilities required in the delivery or development of integrated solutions. The number of informants (n) is presented in the table, when it was available in the reviewed articles.

Table 1. Outline of integrated solutions literature and the related capabilities.

Author(s)	Type of solution	Methodology and empirical data	Capabilities
Brady et al. (2005); Davies (2003)	Product-service bundles	Qualitative multiple case study/ capital goods industry/ supplier data/ n=92	Systems integration capability in the design and integration of systems composed of internally or externally developed hardware, software and services; operational service capabilities; business consulting capabilities, and financing capabilities
Brax & Jonsson (2009)	Product-service bundles	Qualitative multiple case study/ capital goods industry/ supplier and customer data in dyads/ n=57	Supplier's capability for both internal and external integration in customer relationships

Davies et al. (2006)	Mostly product-service bundles	Qualitative multiple case study/ manufacturing and services/ supplier perspective/ n>100	Creating and refining capabilities –front end, back end and centre – that support large-scale and repeatable solutions delivery
Davies et al. (2007)	Mostly product-service bundles	Qualitative multiple case study/ capital goods industry, manufacturing and services/ supplier data	Systems integration capability in terms of being responsible for the general system design, selection and coordination of external component suppliers, integration of components into a functioning system, and the development of technological knowledge needed for future system upgrades
Miller et al. (2002)	Mostly product-service bundles	Qualitative multiple case study/ 30 companies in various industries/ supplier data	Distinctive capabilities to create profitable “solutions surplus” for customers, balancing the customer and capability requirements, and employing a three-faceted organization design (front end, back end and centre)
Shepherd & Ahmed (2000)	Product-service bundles	Qualitative multiple case study/ computer and electronic equipment/ supplier data	Technical competence, integration competence (both technical and organizational), market/business knowledge competence
Skarp & Gadde (2008)	Product-service bundles	Qualitative case study/ steel production/ supplier and customer data in dyads/ n=33	Continuous interactive problem-solving as a key capability of a supplier
Storbacka (2011)	Mostly product-service bundles	Qualitative multiple case study/ ten companies in various industries/ supplier data/ n=15	Capabilities concerning commercialization, industrialization and solution platform; collaborative, cross-functional management practices
Tuli et al. (2007)	Integrated service solutions	Qualitative multiple case study/ IT, health care, real estate, financial services/ supplier and customer data in dyads/ n=104	Relational capabilities in supplier-customer dyads: viewing solutions from a customer perspective instead of the supplier
Windahl & Lakemond (2006)	Product-service bundles	Qualitative multiple case study/ manufacturing/ data from networks (suppliers and customers)/ n=65	Relational networking between the suppliers, research institutes, and governmental agencies

Prior literature dealing with integrated solutions (Table 1) depicts systems integration as the core capability concerning integrated solutions (Brady et al., 2005; Davies, 2003; Davies et al., 2007). Systems integration refers to the general system design, selection and coordination of external component suppliers, integration of components into a functioning system and development of

technological knowledge needed for future system upgrades (Davies et al., 2007). When industrial companies augment their products with services, they need to develop capabilities related to operational services, business consultancy and the provision of financial services (Brady et al., 2005). In line with the solutions literature, Hobday et al. (2005) study systems integration in the literature of complex product-service systems (CoPS). There, they define systems integration capability as “the way in which firms and other agents bring together high-technology components, subsystems, software, skills, knowledge, engineers, managers, and technicians to produce a product”. Consonant with the solutions literature, the capability is highly product, manufacturing and technology oriented, with less focus on the intangible elements of the offerings such as service or knowledge. Furthermore, the authors refrain from taking a strong customer perspective on solutions or addressing the relationships between the customers and suppliers. They even refer to the cooperation with suppliers as *controlling* the supplier network in order for them to produce according to the specification. It is quite the contrary to the co-creation aspect applied in this study, which emphasizes inter-organizational interaction and knowledge sharing – even in a creative manner – in business networks.

Problem solving is regarded as another central capability in solution business (Aarikka-Stenroos & Jaakkola, 2012; Skarp & Gadde, 2008). Storbacka (2011) highlights the collaborative, cross-functional aspect of integrated solutions. Integration of the solution requires coordination between different business units or companies. Thus, in addition to the technical capabilities in bundling the offerings, certain authors remark that integrated solutions require a capability to ensure organizational integration between companies (e.g. Shepherd & Ahmed, 2000). This organizational integration may be also beneficial in integrating service solutions, which requires interaction between network actors. However, the concept of organizational integration is addressed very superficially in earlier literature without further conceptual or empirical elaboration. Furthermore, there is a lack of empirical insight into the required capabilities when knowledge utilization is central in business, as it is in, for example, KIBS.

2.5.2 Research questions and tentative framework of the study

This thesis draws on the theoretical domains of a relational view of a firm, service management, value creation, knowledge management and key account management in the study of co-creating integrated solutions in business networks. This study aims to fill the research gaps identified above by providing a new conceptual understanding of and empirical insight into the required capabilities in the co-creation of integrated service solutions in business networks. The studied business networks represent networks that comprise products and services in interaction as integrated solutions as well as networks that merely comprise services as integrated solutions.

This thesis builds on three research questions (RQ1–RQ3), which the four original articles of the thesis aim to answer. A single article does not link to a specific research question, but all original articles bring insight to the three research questions. Firstly, this thesis builds a general conceptual understanding of integrated solutions offerings and the way integrated solutions are co-created in business networks. The first research question does not distinguish between product-service bundles and integrated service solutions but aims to provide a wider conceptual elaboration of the phenomenon of networked value creation in solution business. Given the aim to strengthen the customer's voice in the solutions domain and the inclusion of suppliers and customers in the co-creation process, supplier and customer perceptions are included, and the first research question (RQ1) is as follows:

RQ1: How can the co-creation of integrated solutions be characterized in business networks?

Secondly, this thesis aims to provide an in-depth empirical insight into the co-creation of service and knowledge-intensive integrated solutions in business networks. This thesis relies on the relational view of a firm. It takes the perspective of an integrating actor of the suppliers that aims to increase its competitiveness through enhancing customer centricity and integrating and applying resources of its partners. Despite the supplier perspective, here, the co-creation of service and knowledge-intensive solutions inevitably involves the customer. The activities that suppliers undertake on the course of the co-creation process are then conducted in cooperation. To elucidate what actually happens in the co-creation of integrated service solutions in business networks, the second research question (RQ2) is as follows:

RQ2: How – through which activities – do suppliers co-create integrated service solutions in cooperation with their business customers in business networks?

Thirdly, the identification of the specific activities that suppliers undertake in the co-creation of integrated service solutions builds the basis for the identification of the related capabilities that an integrating supplier needs. Thus, research questions RQ2 and RQ3 below are closely interlinked. By contrasting the identified activities with the current solutions literature and emphasized capabilities, the central capabilities are identified with the third research question (RQ3):

RQ3: What are the central capabilities required from an integrating supplier that co-creates service- and knowledge-intensive integrated solutions with other suppliers and business customers in business networks?

Various typologies and categorizations of organizational capabilities are abundant in the literature. Within the business network context, for example, Möller and Törrönen (2003) present the required capabilities of suppliers when proceeding in

the continuum from the basic transactional production of core value towards the higher-value levels that require a more relational orientation to value co-creation with customers. Their study resulted in the identification of the following capabilities in the continuum of various value creation modes: production capability, delivery capability, process development capability, incremental innovation capability, relational capability, networking capability and the capability to master the customer's business. Although, for example, customer relationships (i.e. relational capabilities) are emphasized in the current solution literature, the mainstream of the studies tends to provide the strongest empirical insight into capabilities concerning the production of product-service bundles interlinking the studies with more production- and delivery-oriented capabilities (cf. Möller & Törrönen, 2003). Studies have emerged in the past few years, however, that take a strong relational orientation to solution business in business dyads or networks (Aarikka-Stenroos & Jaakkola, 2012; Brax & Jonsson, 2009; Skarp & Gadde, 2008), which is also the focus of this thesis.

In solution literature, for example, Storbacka (2011) addresses the required capabilities and management practices in solution business with the dimensions of commercialization, industrialization and a solution platform. Davies and Brady (2000), referring to Chandler (1992), applied the dichotomy of *strategic* and *functional* capabilities in their study concerning complex product-service systems. Chandler (1992) regards strategic capabilities as concerning the activities through which a company responds to the moves of its competitors, moves to new markets and constantly adjusts itself to the changes that occur in the business environment. Functional capabilities, on the other hand, are related to functional activities, i.e. those of obtaining suppliers, production, distribution, marketing and the related development activities.

The dichotomy of strategic and functional capabilities serves as the basis of framework development in this thesis as both the strategic and functional aspects were central within the studied business networks. The studied suppliers made strategic plans concerning the development of a common solutions offering and analysed markets and customer relationships, together. In addition, functional operations were studied such as knowledge sharing routines and customer experience in daily operative interactions. Chandler (1992) argues that the coordination between several functional activities is even more important than a single functional activity per se. The resulting organizational capabilities permit the company to be more than the sum of its parts. In a similar manner, the studied business networks aimed to be more than the sum of its parts when co-creating integrated solutions, together.

Capabilities can also be distinguished in terms of whether they focus on a company's *internal* or *external* activities. Similarly, the solutions domain distinguishes capabilities in terms of whether the concern is the front end or the back end operations (Davies et al., 2006; Galbraith, 2002; Miller et al., 2002) or the internal or external integration (Brax & Jonsson, 2009). The dichotomy of internal and external capabilities guided framework development of this study because of the obtained service-dominant logic (Lusch & Vargo, 2006; Vargo &

Lusch, 2008) mindset and the salient role of the interaction between suppliers and customers in service business. As follows, data was collected both in supplier and in customer companies.

In sum, this study conceptualizes the co-creation of integrated solutions taking place in a business network – between several supplier companies and a customer company – while they integrate and apply resources in interaction. The resource integration takes place between the set of supplier companies and between the suppliers and their common customer, i.e. between all the network actors. Resource integration then requires both ‘internal’ (between the suppliers) and ‘external’ (with the customer) capabilities from the suppliers’ perspective. The companies undertake resource integration at both strategic and operative level. Consequently, both strategic and functional capabilities are required in the solutions co-creation. Figure 3 outlines the tentative framework of this thesis based on the above-mentioned dimensions of capabilities.

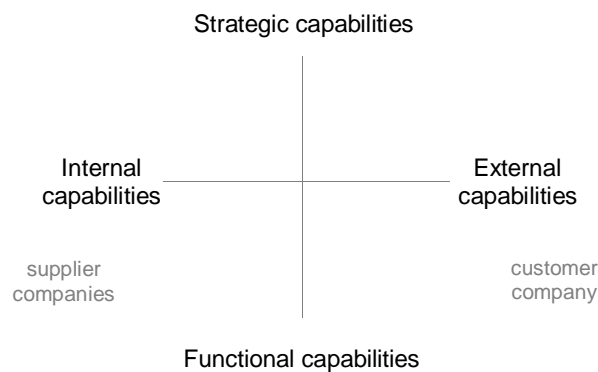


Figure 3. Tentative framework of the thesis.

The original articles of this thesis are analysed through the framework, and related activities are identified in co-creating integrated service solutions. Finally, conclusions are drawn on the central capabilities required from an integrating supplier in the co-creation of service- and knowledge-intensive integrated solutions with its partners and customers in business networks.

3. Methodology

This chapter shows how this study was conducted and the reasons for the selection of the research design, cases and methods. Finally, an assessment of the research presents how the quality of this research was assured.

3.1 Nature of the research

All research builds on a philosophical foundation consisting of the stances taken towards ontology and epistemology. In the subjective-objective continuum of social sciences (Morgan & Smircich, 1980), this study is positioned between the objective and subjective end of the continuum, but it does not purely apply either one. Instead, this study relies on critical realism (e.g. Easton, 2010; Leca & Naccache, 2006; Miller & Tsang, 2010; Modell, 2009; Reed, 2005; Suddaby, 2006). Critical realism combines elements of both realist and constructionist thinking (Modell, 2009; Reed, 2005). A critical realist approach proposes a 'stratified' model of reality dispersed into three domains: the *empirical* domain is that of experienced – observable – events, the *actual* domain is the surface of reality, and the *real* domain consists of structures and causal powers that generate events (Leca & Naccache, 2006). The real and actual exist beyond the researchers' observations. It is through the 'empirical' that a researcher can observe, as part of the 'actual' and, consequently, reveal underlying structures and mechanisms of the 'real'. Thus, critical realism seeks explanations, causal mechanisms of the underlying 'generative mechanisms or structures' that shape companies and the related social relations (Easton, 2010; Miller & Tsang, 2010; Reed, 2005).

Consequently, critical realism relies on realist ontology and the assumption that there is an observable world independent of human consciousness and researchers' knowledge of it (Miller & Tsang, 2010). There are concrete structures in the real world, such as organizations and relationships between organizations. On the other hand, critical realism takes an epistemological stance, regarding knowledge of the world as being socially constructed (Miller & Tsang, 2010). Accordingly, this study builds on the assumptions that knowledge is socially constructed in companies and business networks. In addition to acknowledging

the existing concrete structures or mechanisms in the business world, this study interprets informants' perceptions and experiences of the world. However, it is also recognized that there is a possibility of truthfully knowing that human limitations exist regarding the creation of definite objective knowledge (Miller & Tsang, 2010).

The nature of the research and the aim to increase understanding of how companies co-create integrated solutions in business networks motivated the selection of a qualitative case study research approach. The aim is to yield understanding of the studied phenomenon by conceptualizing it and providing rich empirical insight into managing solution business in business networks. The aim of this thesis is to extend and complement prior literature with various perspectives and to provide a new empirical insight and advice for practitioners in business. Instead of breadth, depth of research and richness of qualitative data are pursued with a limited number of cases and studied companies. In accordance with the critical realist approach, the study is contextualized as the causal powers strongly depend on the contextual conditions (Leca & Naccache, 2006).

3.2 Research design

In line with the prominent methodology applied in industrial marketing literature (Halinen & Törnroos, 2005; Piekkari et al., 2010), this research also builds on case studies. Case studies are considered a useful approach to increasing understanding of topics that have previously been under-investigated (Gummesson, 2000). A case study approach was selected because of the desire to increase understanding of complex social phenomena by seeking answers to the question: how do companies co-create solutions within business networks? Case study design was the preferred strategy for the following reasons: a) 'how' questions were posed in this research, b) the investigator had little control over events in the studied companies, and c) the focus was on a contemporary phenomenon within a real-life context (cf. Yin, 2003). The case study designs and cases were selected in line with the research questions or the purposes of the original articles. The research questions guided the selection of representative cases, i.e. the research based on theoretical sampling (Eisenhardt & Graebner, 2007; Silverman, 2006). Companies that co-created integrated solutions in cooperation between several companies were then selected for the study.

There are four types of case study designs depending on whether it is a single or multiple case study and the kind of unit of analysis (Yin, 2003). Holistic multiple case designs were selected in Articles I and II. Then, solution networks (Article I) and two integrated solutions (Article II) were selected as the units of analysis. The selection of two solution networks that comprised several companies' resources enabled the investigation of value co-creation in different business networks in Article I (Figure 4). The studied business networks are intentionally created closed networks, and the motive of the suppliers was business renewal through networking (cf. Möller & Rajala, 2007). In Article II, two different industrial and KIBS solutions co-created in business networks were compared (Figure 4).

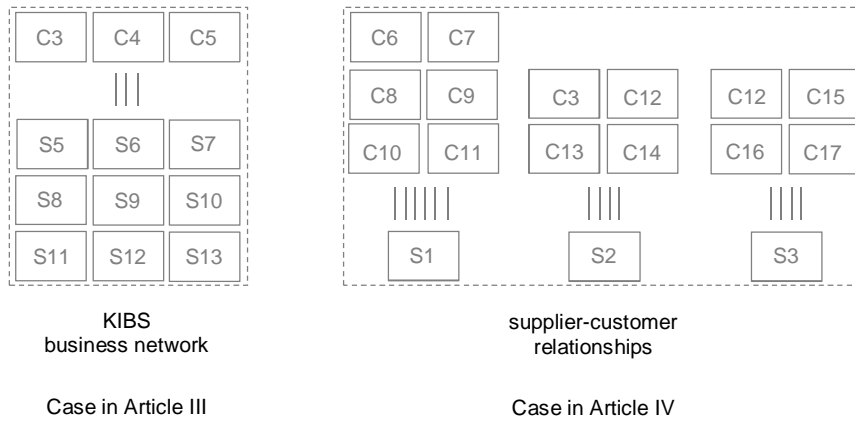


Figure 5. Outline of the cases in Article III and Article IV.

3.3 Outline of the companies

With the focus on solution business, which emphasizes long-term orientation in building and maintaining business-to-business relationships, this type of business networks and business relationships were selected for the study purposes. Thus, the companies were mainly studied in their business network, in which several suppliers and customers are a part of the same network. Altogether, 30 companies – 13 suppliers and 17 customers – attended this research. With the limited number of cases and companies, the aim was rather to provide a rich empirical, in-depth insight into the phenomenon in the selected contexts rather than aiming for statistical generalization. Table 2 outlines the supplier companies that attended this research and the business fields in which they operate.

The supplier companies S1, S2 and S3 as well as the consolidated group (supplier companies S5–S13) attended large service business research projects (VersO and SOUL), which facilitated access to the companies. The motivation to attend such research projects derived from the management view that networking could offer them new business possibilities. The companies needed new knowledge of their business customers and sought for practical tools to develop integrated solution offerings and to enhance solution business and cooperation in business networks.

Because the boundary of any network is always arbitrary (Halinen & Törnroos, 2005), we limited the research to the most important partners and customers, which the suppliers pointed out. This helped to master the research and the

amount of research data. The suppliers specially selected customers in the study in terms of the sales volume and the future potential of the customer relationship. The selected partners and customers were important in terms of the strategic aims of the companies and/or they had a long history of successful cooperation. Some of the studied business relationships between the suppliers and customers had lasted for years, even decades, especially among the KIBS suppliers and their customers. In Articles I and II, new relationships and potential customers were studied in addition to long-term customer relationships.

Table 2. Outline of the studied supplier companies and their business fields.

Company	Business field
S1	Machine tools and industrial services
S2	Robots and technical support services
S3	Chip removal machining and production systems
S4	Maintenance software
S5	Group administration
S6	Advertising
S7	Media planning
S8	Customer relationship management
S9	Business consultancy
S10	Production
S11	Marketing
S12	Media agency
S13	Brand design

All the studied supplier companies are small and medium sized enterprises (SMEs). They represent business fields such as technical trade and automation industry (i.e. S1–S4). The studied KIBS suppliers (i.e. S5–S13) operate on marketing and advertising. The suppliers are mostly concentrated on their core-competences, which motivated them to search for complementing resources from partners. They were also eager to co-create new solutions together and reach new markets. Management and employees from the companies attended the development work concerning network cooperation and integrated solutions. With the upper management involvement and the small organizations of SME's, decision-making was rather rapid in development work and companies could openly discuss strategic issues together. On the other hand, SMEs' limited resources occasionally hindered the execution of their development actions.

Most of the studied customer companies are large. They represent a wide spread of various business fields such as the manufacturing industry, food industry, and travel services (Table 3).

Table 3. Outline of the studied customer companies and their business fields.

Company	Business field
C1	Manufacturing industry
C2	Manufacturing industry
C3	Food industry
C4	Travel services
C5	Food industry
C6	Mechanical engineering
C7	Minerals and metals processing
C8	Base metals production
C9	Mechanical engineering
C10	Construction machine rental
C11	Construction machine rental
C12	Material handling solutions
C13	Food industry
C14	Pharmaceuticals
C15	Automation industry
C16	Metal industry manufacturer
C17	Engineering steel producer

One example of an integrated solution studied in this thesis is a knowledge-intensive service solution offered by supplier companies S5–S13 in marketing and advertising. Depending on the customer need, various solutions are integrated using the resources of the customer and supplier companies. A solution can contain, for example, an advertisement in print media and TV, new package design, and business consultancy. The integrated solution results in coherent marketing communications and easier service procurement for the business customers. A key account manager or director operating in one of the supplier companies knows a customer's business over a long time and is able to build various solutions combining the resources of the suppliers.

The industrial solutions studied in this thesis were integrated from technological solutions such as machine tools or robots and services in terms of installation, repair and maintenance, and technical support. These solutions were more standardized than the studied KIBS solutions as the suppliers aimed at productizing their service offering and augmenting the products with repair and maintenance contracts.

3.4 Data collection

The aim of the data collection was to gather rich and detailed real-world data in companies – the informants' sensations, impressions and perceptions concerning the companies' business, solutions, the co-creation process and the business

relationships between the companies. In-depth interviews were used as the main data collection method to increase understanding of the studied phenomenon. The selected interviewees were comprehensively involved in the co-creation of integrated solutions and occupied a central position concerning relationships between the supplier and customer firms. The companies that attended VersO and SOUL projects helped with the selection of other companies and interviewees within the business network (i.e. their partners or customers).

The interview outlines were formulated in cooperation between the research teams of the two research institutes (VTT and Turku School of Economics) in the VersO and SOUL projects. The outline of the interview themes are attached to this thesis as Appendix A. The interviews followed a loose thematic guide and allowed the informants a great deal of freedom to express their views and raise new issues (Yin, 2003). Thus, the interviews were more like guided conversations than structured queries and, consequently, we were able to exploit naturally occurring data (Silverman, 2006). To ensure that all the interview themes were thoroughly discussed and minimize investigators' biases, most of the interviews were conducted in researcher pairs. The interviews typically lasted about an hour each. The interviews were recorded and transcribed verbatim.

In addition to in-depth interviews, data were collected through participant observation in company workshops. In the participant observation, the researchers were not merely passive observers but could assume a variety of roles within a case study situation, and they actually participated in the events being studied (Yin, 2003). However, in this research, participant observation and attendance at company workshops were used specifically for verification and triangulation purposes, consequently improving the trustworthiness of the study (Yin, 2003). Company workshops provided insights into the networked solutions co-creation from several angles. The workshops dealt with topics such as defining and describing the solutions offering, identifying the benefits of the integrated solution and cooperation, and sharing business customer and market knowledge between the suppliers. Attending workshops with confidential discussions enabled the researchers to deepen their understanding with regard to the studied phenomenon and to ensure they had understood correctly the issues and views discussed in the interviews. To illustrate the close relationship and openness between the researchers and the companies, the researchers were also able to attend sales negotiation meetings between a supplier and its potential customers. Company workshops and meetings were documented by taking notes. However, the company representatives made sure that business secrets would not leak due to the research by checking and approving the original articles of this thesis prior to their publication.

Altogether, 101 informants – of which 73 supplier and 28 customer representatives – were selected for this research. Part of the interview data has been used in several articles of this thesis. The time boundary of data collection was Nov 2009 – Jan 2013. The following table outlines the data collection for the original articles.

Table 4. Outline of the data collection.

Article	Supplier informants (n)	Customer informants (n)	Company workshops
I	31	8	16
II	43	8	14
III	31	16	–
IV	22	8	7

3.5 Data analysis

In line with the critical realist approach, the data collection and analysis were aimed at comparing different cases (Miller & Tsang, 2010). In three articles of this thesis (Articles I, II and III), a tentative framework was built based on the literature to encapsulate the focus and contents of the research. These frameworks explain, graphically, the main things to be studied – the key factors, constructs or variables – and the presumed relationship between them (Miles and Huberman, 1994, p. 18). Tentative frameworks drawn from literature served as the basis for the data analysis in Articles I, II and III. The categories for data analysis in Article IV emerged from the collected data. However, all the frameworks focused the research on the various perspectives taken on the studied phenomenon and served as ‘lenses’ through which the data was coded and analysed. Consequently, the frameworks provided a category system, which enabled filtering of the studied aspects from the interview data with content analysis (Mayring, 2000). As Kohlbacher (2006) summarized by referring to several other authors, the raw data are transformed into a standardized form in content analysis and the data condensed into their essence by identifying substantive statements. This leads to a significant reduction in the amount of data while preserving the original message of the text and revealing insights concerning the research question.

The data analysis proceeded systematically from the reading through of all the interview transcripts to selecting illustrative quotations and placing them under the categories in tables. For example, in Article I, text extracts that described the benefits and sacrifices that company representatives perceived in co-creation with integrated solutions were placed in the data analysis table. In addition to the categories reflecting the tentative frameworks, data were also categorized at company level, business dyad level and network level. The supplier and customer perspectives were also separated in the data analysis tables. As a result of selecting text extracts and categorizing them, the data were summarized and the material reduced in such a way that they still preserved the essential content of the interviews and reflected the original material (cf. Mayring, 2000). Table 5 outlines the focuses of the data analysis in the original articles of this thesis.

Table 5. Focus of data analysis in the original articles of the thesis.

Article	Focus of data analysis
I	Identification of perceived value, i.e. benefits and sacrifices at three levels: actor level, relationship level and network level
II	Identification of the factors affecting effective co-creation of integrated solutions through the service concept lens
III	Identification of the activities KAM teams undertake in knowledge acquisition, assimilation and application
IV	Identification of the factors affecting industrial service procurement of business customers

People's behaviours and their accounts are always contexted or situated, which is why qualitative research not only reports people's experiences or uses an actor's point of view as an explanation (Silverman, 2006). Consequently, the next phase of data analysis went beyond that and analysed and interpreted the data – discovering mechanisms that explained various events in the cases (cf. Miller & Tsang, 2010).

In the holistic multiple case studies (Articles I and II), the first step of the data analysis was within case analysis to enable unique patterns of each case to emerge, followed by cross-case comparison (Eisenhardt, 1989). The purpose of the comparison was to elucidate the differences of different contexts (industrial versus KIBS network) and different solutions (industrial versus KIBS solution). In Article III, knowledge utilization was studied among the suppliers, in supplier-customer dyads and at network level. Finally, conclusions were drawn at network level on how KAM teams co-create integrated solutions with their business customers. In the embedded single case study in Article IV, the data were analysed first in terms of factors that affect business customers' service procurement in the studied business relationships. Next, interpretations were made and conclusions drawn at case level. Data were collected and analysed to the point at which the data seemed to reach saturation point – a new informant did not elicit new interesting insights into the matter. Naturally, research funding and time also dictated boundaries for data collection and analysis.

Next, the findings were reflected against extant literature to formulate the contributions. A broad range of literature was considered at this point, which is especially important in the theory-building research as the findings often rest on a limited number of cases (Eisenhardt, 1989). Theoretical contributions were identified by addressing how the results extended and complemented the literature. Finally, managerial implications were outlined to provide advice for business managers and enhance the practical relevance of the study. The results were reported with quotations to increase the transparency of the data and provide illustrations of the phenomenon in a real-life context. The names of the participating firms and the informants were disguised in the reporting to maintain anonymity.

3.6 Assessment of the research

The quality of this research was assured by selecting and using appropriate methods and being rigorous, critical and objective in handling the data (Silverman, 2006). The qualitative research approach guided the selection of pre-understanding, credibility, dependability, conformability and transferability as the assessment criteria of the research (e.g. Bradley, 1993; Denzin & Lincoln, 2011; Gummesson, 2000; Lincoln & Guba, 1985; Lukka & Modell, 2010; Miles & Huberman, 1994). These criteria reflect the ontological and epistemological stances that this study occupies in terms of the critical realism approach.

Gummesson (2000) has emphasized the importance of pre-understanding by the researcher. This refers to things such as knowledge, insights and experience of the investigator before he/she engages in a research project. The pre-understanding of the author of this thesis builds on the acquaintance of the theoretical phenomena of this study and the long-term experience of research and consultancy in several business fields. Previous knowledge and experience facilitated the collection of beneficial data, interpretation, and drawing of conclusions from the collected data. Previous experience of academic writing and publishing also facilitated the writing process and enhanced the quality of this research.

Credibility is defined as the “adequate representation of the constructions of the social world under study” (Bradley, 1993, p. 436). In other words, how confident can we be in the “truth” of the findings (Lincoln & Guba, 1985). Assuring the credibility of this research started with the selection of representative cases and appropriate methods, as described earlier in this section. As Lincoln and Guba (1985) suggest, the following means were used to improve the credibility of the results in this research: prolonged engagement in the field, persistent observation, triangulation and peer debriefing. Researchers worked in close cooperation with the company representatives for years and were involved in confidential discussions in and between companies. In the interviews, the informants also shared information very openly concerning their business and the relationships with other companies. In addition to the workshops, which were used for observation and collecting additional data for the original articles of this thesis, several meetings and seminars were held within the research group.

Triangulation was done using multiple methods, different sources and investigators (Lincoln & Guba, 1985). Data were collected with several methods such as in-depth interviews, observation and attending company workshops. In addition, data were collected from multiple sources – from supplier representatives and customer representatives and from representatives at different organization units and levels. A sufficient number of informants ($n = 30\text{--}51$ in the original articles) led to saturation of the data and provided versatile views and knowledge with regard the phenomena studied. The collection of versatile views and data with several methods enabled a deep understanding of the phenomenon and companies' everyday lives to be acquired. Interviews and activities with the

companies attending the study were all carried out by pairs of researchers, which enabled peer debriefing and comparisons of the interpretations (Lincoln & Guba, 1985). To check the accuracy of the research results and the researchers' interpretations, the results were presented and discussed with company representatives in company meetings. This way, any biases of the researchers in their interpretations could be minimized.

It is worth noticing, however, that the research audience ultimately determines what is regarded as valid research findings (Lukka & Modell, 2010). Against this notion, the acceptance of the three articles of this thesis (Articles I, II and III) for publication through the peer review process of distinguished scientific journals such as *Industrial Marketing Management* and *Journal of Service Management* strengthens the credibility of this research.

The aim of dependability is to be sure that if a later investigator followed the same procedures as described by an earlier investigator and conducted the same case study all over again, the later investigator should arrive at the same findings and conclusions (Yin, 2003). The dependability of this research was assured by recording the interviews, transcribing them, presenting long extracts of data in the original articles (Silverman, 2006) and attaching the outline of the interview themes to this thesis (Appendix A). This way, the research process was made transparent for the audience. A research log was established to keep track of the data collection.

Confirmability refers to the degree of neutrality or the extent to which the findings of a study are grounded in data and not the researcher's personal constructions (Lincoln & Guba, 1985). To increase the objectivity of the research and eliminate researcher bias, the interview questions were formulated in a team of researchers from two research institutes. The interviews were mainly conducted in research pairs and the interviewees were not led in their answers. The findings and interpretations were discussed in case of misunderstandings among the research teams and with the informants.

Transferability refers to the extent to which the findings have applicability in other contexts (Lincoln & Guba, 1985). This way it is analogous to generalizability used in positivist research. As the aim of this study was to increase understanding of the studied phenomenon and to extend and complement the theory, statistical generalization was not relevant, but analytical generalization is still possible to achieve (Yin, 2003). Detailed descriptions were provided so that potential appliers are able to make judgements about the transferability of the research results (Lincoln & Guba, 1985). The results of this research are highly likely to be applicable in similar contexts and in solution offerings studied in this research.

To further enhance transferability, the research results were presented and discussed in tens of seminars, which were attended by over a hundred company representatives from various business fields. In the seminars, company representatives commented on the research – what they found that was applicable to their business and how and what was not. Within the VersO and SOUL projects, several measures were taken to help the companies apply the results in their businesses. For example, the company representatives and researchers ideated

together in the workshops on how the research results and, especially, the managerial implications could enhance their business and development activities. Some of the managerial implications were developed as consulting tools concerning the management of solution business and spread across several customer projects at VTT. The means to ensure the quality of this research are summarized in Table 6.

Table 6. Means used to ensure the quality of the research.

Criterion	Means to ensure the quality and trustworthiness of the research
Pre-understanding	<ul style="list-style-type: none"> • The author's research and consultancy experience since the year 2000 in several business fields • Management of two large service business projects (VersO and SOUL) during 2009–2013 • Publication of over thirty research papers on business networks and solution business
Credibility	<ul style="list-style-type: none"> • Close cooperation with the studied companies • Methodological and researcher triangulation • Data from several sources • Sufficient numbers of informants • Accepted articles in peer-reviewed scientific journals
Dependability	<ul style="list-style-type: none"> • Research log to keep track of data collection • Recorded and in verbatim interview transcripts • Extensive use of quotes in reporting • Interview forms as appendices of this thesis
Conformability	<ul style="list-style-type: none"> • Interview questions formulated in cooperation with a team of researchers representing two research institutes • Interviews conducted in pairs of researchers • Researchers refraining from leading the interviewees • Discussions of the findings and interpretations among several researchers and the informants
Transferability	<ul style="list-style-type: none"> • Broad description of data and cases • Discussion, reflection and common ideation regarding the applicability of the results in company workshops • Presentations and discussions of the results in several seminars in which tens of companies (outside the VersO or SOUL project) attended from various business fields

4. Results

This chapter summarizes the results and contributions of the original articles. Section 4.5 presents the central activities in the co-creation of integrated solutions in the business network based on the results and contributions of the original articles.

4.1 Value co-creation in solution networks

The contemporary perspective indicates that value co-creation occurs when actors integrate and apply resources in interaction with other actors in a network (e.g. Gummesson & Mele, 2010; Lusch et al., 2010) and perceive benefits and sacrifices in the use of the resource or the interaction (Ravald & Grönroos, 1996). However, empirical research on value outcomes for the actors involved in networked solution business remains scarce.

Drawing on empirical data, the theoretical underpinnings of value research (e.g. Ravald & Grönroos, 1996; Woodruff, 1997) and the interaction and network approach (Håkansson & Snehota, 1995), Article I investigates how value is co-created in solution networks entailing both supplier and customer perspectives (Jaakkola & Hakanen, 2013). More specifically, it studies how supplier and customer companies integrate resources in interaction to co-create integrated solutions within a business network and identifies the related benefits and sacrifices perceived by each actor in two different solution networks: a network co-creating a knowledge-intensive service (KIBS) solution and a network co-creating an industrial service solution that is a product-service bundle. Firstly, the characteristics of the studied solution networks are described.

4.1.1 Characteristics of the solution networks

The way resource integration accrues value in a network context is studied with an interaction-based framework in Article I. As a result, the characteristics of the studied solution networks are described with the Actors – Resources – Activities (ARA) model (Håkansson & Snehota, 1995) (Table 7).

Table 7. Characteristics of the studied solution networks (Jaakkola & Hakanen, 2013).

	Industrial solution network	Marketing solution network
Actors	<ul style="list-style-type: none"> • The central supplier and customer firms involved in the development and delivery of the integrated solution • Clearly defined and stable network positions • Strong personal bonds only between some actors 	<ul style="list-style-type: none"> • The central supplier and customer firms concerning the development and delivery of the integrated solution • Dynamic network positions and effort to improve one's position • Strong personal bonds between actors in all supplier and customer organizations • The importance of personal relationships and 'chemistry' between people
Resources	<ul style="list-style-type: none"> • Operand resources (products) augmented with operant resources (services) • Solution comprising rather standardised components • A clear and predefined resource constellation • Customer resources utilized especially in selecting technology options to fit the solution to the customer's manufacturing process 	<ul style="list-style-type: none"> • Operant resources: knowledge, expertise, skills, information • Highly customized solution • Differing resource constellations because of the creative process and varying customer needs • Customer resources pivotal
Activities	<ul style="list-style-type: none"> • More or less transaction-based relationships • Systematic activities and mapped processes • Straightforward integration because of a clear division of solution components • One company responsible for coordination and the customer interface 	<ul style="list-style-type: none"> • Administrative and technical links due to part-joint ownership • Complex pattern of activities in solution development • Flexible processes • Resource integration through rich ideation, problem solving, interaction and mutual adaptation • Coordination is demanding, as all actors are involved in activities with the customer

When contrasting the two solution networks, it became evident that the knowledge-intensive solution within the Marketing Solution Network required a complex pattern of activities when knowledge and other resources were integrated

in interaction. Network positions varied over time and some suppliers competed over the position of the integrating actor. All the suppliers operated on the customer interface in the Marketing Solution Network, and customer participation was regarded as pivotal to customizing the solution to customer needs. In addition, the importance of personal bonds, trust and 'chemistry' between people was highly emphasized.

4.1.2 The value perceptions of the network actors

Value creation occurs in solution networks at three levels: actor level, in relationships between actors and within a network of actors (Jaakkola & Hakanen, 2013). Article I presents the value perceptions that each network actor perceives in resource integration. Table 8 provides examples of the value perceptions within the studied solution networks (modified from Jaakkola & Hakanen, 2013).

Table 8. Examples of the perceived benefits and sacrifices in solution networks (modified from Jaakkola & Hakanen, 2013).

Actor, network position	Benefits	Sacrifices
Customer	<ul style="list-style-type: none"> • Concentration on core business • Ease of buying with the 'one-stop shop' principle • Less coordination work • Better results through a seamlessly integrated solution 	<ul style="list-style-type: none"> • Incoherent customer experience from suppliers • Lack of control over service suppliers • Suspicion over the value of the integrated solutions • Lack of transparency in pricing
Supplier, integrating actor	<ul style="list-style-type: none"> • Profitable business through being 'close to the customer' • Differentiation from competitors through access to partners' various resources • Flexibility of resource allocation 	<ul style="list-style-type: none"> • Sales and marketing effort • Coordination and integration effort • Challenges in cooperation due to overlapping goals between the suppliers • Risks concerning a partner operating on the customer interface under own brand
Suppliers to integrating actor	<ul style="list-style-type: none"> • Credibility from being a part of a known network • Gaining access to a new market • Learning about new customer segments • Fewer or no sales activities 	<ul style="list-style-type: none"> • Limited potential to affect sales, timetables and content of the solution • Competition between the suppliers • Lack of trust in each other's competences • Lack of motivation to act as a mere resource provider

The basic prerequisite for a business customer to purchase integrated solutions is the value accrued. It should be more beneficial to purchase an integrated solution from a group of suppliers than to purchase separate products and/or services from several suppliers, i.e. an integrated solution should be more than the sum of its parts. The study results show that value is accrued from the ease of buying solutions, i.e. the possibility to purchase integrated solutions from a set of suppliers with the 'one-stop shop' principle. Value is also accrued from the extensive assortment of resources, which enables the fulfilment of extensive customer needs. Cooperation was easy and clear when one of the suppliers took responsibility for integration and coordination. On the other hand, customers perceived sacrifices such as the occasionally received incoherent customer experience from the service suppliers. This jeopardized the aim of seamless integration of solutions. The conflicting goals of the suppliers, overlapping competences and competition over the network positions jeopardized the idea of seamless integration.

Although the customers appreciated a supplier operating as an integrating actor – bundling the solution for them and 'orchestrating' the network of actors – they were suspicious concerning the cost structure of the solution. They were not always ready to pay for the integration work in spite of the benefits they had perceived. The challenge was also noticed among the suppliers, as the following quote illustrates: *"How can we get the customer to pay for the integration and network coordination tasks? How can we make the benefits visible that our coordination work saves the customers time and effort?"* (Supplier).

4.1.3 Contributions of Article I

Article I of this thesis contributes to the research on solutions by providing new conceptual understanding regarding the value co-creation that occurs in the interplay of actors, resources and activities in networks (Jaakkola & Hakanen, 2013). The study proposes potential linkages between the value perceived by single actors and the value perceived at network level. The empirical insights into the way value is co-created in solution networks and the value that different participants perceive in solutions contribute to the solution literature, which has studied business relationships and collaboration between multiple actors within a network (Davies, 2004; Windahl & Lakemond, 2006; Tuli et al., 2007; Cantù et al., 2012). It provides empirical insight into value co-creation in networked solution business while a significant proportion of the literature conceptually discusses the topic (e.g. Lusch et al., 2010; Lusch & Vargo, 2006; Gummesson & Mele, 2010). The study showed that the network position (cf. Johanson & Mattsson, 1992) of the suppliers (i.e. the integrating actor or a supplier for the integrating actor) might have a significant impact on the kind of benefits and sacrifices the actor perceives in cooperation. Furthermore, the study contributes to the prominently product-oriented solutions literature (e.g., Matthyssens & Vandenbempt, 2008; Skarp & Gadde, 2008) by addressing the integration of service solutions. The type of

resources – whether the solutions combine products and services or merely services – may be an antecedent to certain benefits and sacrifices. The intangible nature of integrated solutions in KIBS, for example, would then cause uncertainty with regard to solution value and process for suppliers and customers.

4.2 Integrated solution as a service process

Although companies engage in solution business in an increasing manner, they often struggle to design customer-focused solutions and ensuring effective solutions delivery (e.g. Tuli et al., 2007). Article II therefore studies how customer-focused solutions are co-created in business networks and which factors affect the effective co-creation from both the suppliers' and the customers' perspectives in two different cases (Hakanen & Jaakkola, 2012).

Article II regards a solution as a *service process* characterised by interaction and co-creation when the solutions are seen from the customer's viewpoint. The co-creation of solutions is therefore studied through a theoretical 'lens' based on the service concept framework (e.g. Goldstein et al., 2002; Johnston & Clark, 2008). The tentative framework of the study addresses the elements of the service concept that are the core content of the solution, operations and processes needed to create the solution, customer experience and outcome of the solution, and its value to the customer. The next sections summarize the findings of Article II according to these elements.

4.2.1 Core content of the solution

When analysing the contents of the two solutions, that of the Industrial Solution could be somewhat standardised while the Marketing Solution was always more or less customized to customer-specific needs. The Industrial Solution combines robots, machine tools and industrial services for manufacturer customers. The Marketing Solution is a highly customised knowledge-intensive service solution offered by a group of companies operating in the field of marketing services. Their customers represent various business fields, such as travel services and the food industry.

Sometimes, the problem or the need of the purchaser of a Marketing Solution was unclear even to the customer. The co-creation process therefore began with the identification of the problem, followed by common ideation between the actors. Occasionally, when there were several possible solutions to a customer problem, agreeing on the content of the Marketing Solution was challenging. Suppliers competed with each other and disagreed on the 'best' solution to the customer problem. Another factor affecting the definition of the solution content was the customers' preferences with regard to how much they opened up and shared confidential information regarding their businesses.

4.2.2 Outcomes and value of the solution

Customers appreciated the possibility of centralizing their purchases and purchasing extensive solutions combining various resources from the suppliers with the 'one-stop shop' principle. A supplier taking responsibility for network coordination was also regarded as saving the customer time and effort. Some of the customers saw that common co-creation with marketing and advertising suppliers was pivotal and very beneficial to their business: *'It's been very important for us that we've found the kind of partner with whom we've been able to spar ... we get to know of different kinds of possibilities that we may not have noticed or understood by ourselves. ... We couldn't do this by ourselves. When we're open and honest about our challenges and do this together, the end result is better.'* (Customer). The suppliers anticipated that the integration would lead to the co-creation of a seamless solution and could result in innovative bundles of resources to solve the customer's extensive problems, but they remarked that these aspects were not sufficiently highlighted in service selling. Thus, customers varied in terms of their willingness to purchase integrated solutions.

4.2.3 Service operations and processes

When comparing the way the suppliers had mapped the processes in both cases, the mapping of the service processes in detail was found to be a more demanding task in the Marketing Solution case than in the Industrial Solution case. This was probably due to the highly knowledge-intensive and customised nature of the solution. Suppliers perceived that a central question with regard to service operations and processes was to agree on the role and task division among the suppliers, especially which one of the suppliers should take the leading role and in which tasks suppliers should operate on the common customer interface. It was also a case-by-case decision which suppliers would attend the ideation phase with the customers and which only the later phases of the solution process. It was important to plan the role and participation of customer representatives in the solutions process. Some of the customers preferred to have more control of organization while others gave a completely 'free hand' to suppliers to decide how they organized themselves in teams and how they executed the solution process.

When the roles and tasks of the suppliers were unclear, it influenced the customer experience negatively and hindered the suppliers in providing a seamless solution for the customer. The customers also noticed the rivalry between some of the suppliers, which confused the customer, as the following quote illustrates: *"No matter how much they say they operate as a network, we can still read between the lines that they compete with each other. If it [operating as a network] is their desired state, it should be the desired state for all the companies."* (Customer) However, several informants pointed out that very often, when there was rapport and trust between the professionals, co-operation was very inspiring and rewarding.

4.2.4 Customer experience

The intensity of customer participation in the solution process varied between the Industrial and the Marketing Solution. Installation, repair and maintenance services demanded little effort or participation from customer representatives, but service suppliers operated quite independently in the customer's manufacturing while the Marketing Solution required common ideating and planning almost without exception with the customer. When comparing the cases, it became evident that the clarity of the service process and the outcome affects customer experience. The ambiguity, which was caused by the intangible, customized solution in the Marketing Solution case, increases the experience of risk and uncertainty associated with service. In the Marketing Solution case, customers emphasised the importance of personal relationships and individual talents of the supplier firms in solutions co-creation, which significantly affects their value perceptions and customer experience. The following figure summarizes the factors affecting the effective co-creation of customer-focused solutions (Figure 6).

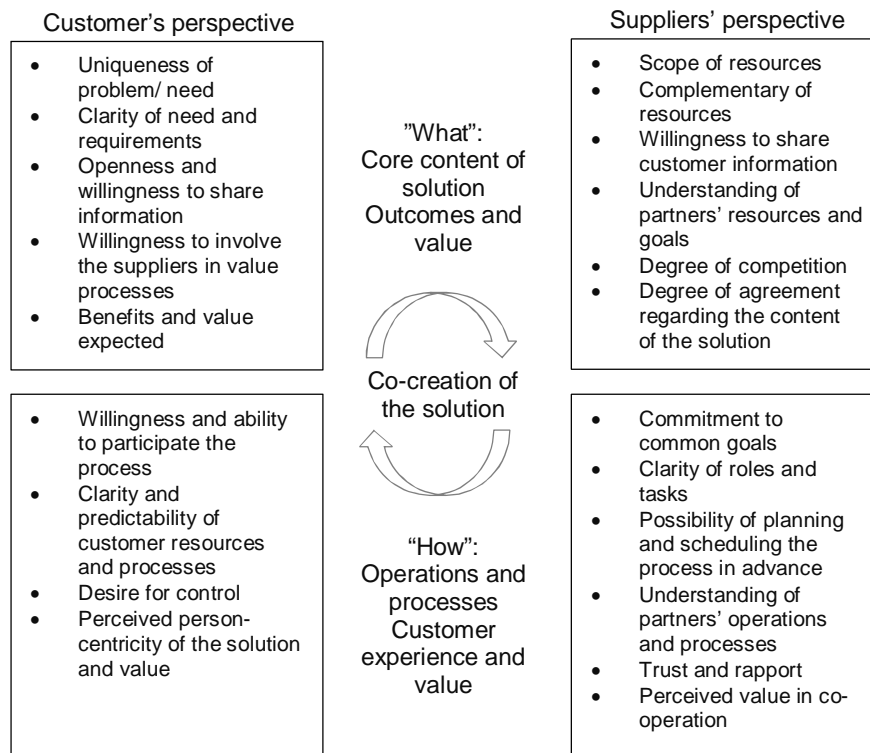


Figure 6. Factors that affect the co-creation of integrated solutions within business networks (Hakanen & Jaakkola, 2012).

4.2.5 Contributions of Article II

Article II (Hakanen & Jaakkola, 2012) contributes to previous solutions literature, which emphasizes the relational and interactive perspective on solutions (Tuli et al., 2007; Skarp & Gadde, 2008; Brax & Jonsson, 2009) but has not elaborated on the factors that affect the customer experience of co-creation. The paper also contributes by providing an empirical insight into the co-creation of integrated service solutions, a rarity in the literature, which mainly investigates product-service bundles (Nordin & Kowalkowski, 2010).

The article is among the first studies to investigate the perceptions of an entire business network – both suppliers and the business customer – while co-creating integrated solutions. It is also one of the first studies to combine the theoretical domains of service and solutions literature. The study concludes that effective solution co-creation requires a fit between not only the offering and the customer need and value expectations but also the goals, preferences and resources of the supplier firms.

With the application of the service concept in the study of integrated solutions, attention was drawn to the relational and interactive nature of the solution (cf. Tuli et al., 2007). The approach resulted in emphasizing the value of the integrated solution and customer experience that several suppliers provide in interaction with the common customer. Compared with the co-creation of product-service bundles, in which suppliers may reach a clear division between the front- and back-office operations (cf. Foote et al., 2001; Galbraith, 2002), services involve all the suppliers on the customer interface. When comparing the product-service bundles and ‘pure’ service solutions, service solutions required more interaction and knowledge exchange between the network actors. All the actors needed to gain a mutual understanding of the customer need, the content of the solution and the co-creation process (Hakanen & Jaakkola, 2012). Consequently, the resulting solution is seamless and may provide more value than the parts alone (cf. Brax & Jonsson, 2009).

4.3 Knowledge utilization in solutions co-creation

Effective knowledge utilization is a salient prerequisite for value co-creation in knowledge-intensive service business (KIBS). Article III identifies the central role of key account management (KAM) teams in networked solution business. The KAM teams facilitate the co-creation of integrated solutions by integrating resources into customers’ extensive needs, enabling the customers to centralize their purchases and complex knowledge flows and to coordinate the network of actors (Hakanen, in press). In this case, KAM teams were responsible for the entire solutions process, from sales to the implementation of the solution with customers. In the co-creation of integrated solutions within business networks, KAM teams are considered knowledge integrators between the suppliers and the customer company. Article III analysed the KAM teams’ absorptive capacity

(Cohen & Levinthal, 1990; Lane & Lubatkin, 1998; Zahra & George, 2002), i.e. how knowledge is acquired, assimilated and applied in the co-creation of integrated solutions. Next, the results of the analysis is presented on the basis of the data collected in the supplier companies operating in KIBS (advertising, marketing and consulting) and their customer companies.

4.3.1 KAM team activities in knowledge acquisition

It became evident in the study that KAM teams acquire versatile knowledge from several sources in order to provide solutions successfully to their business customers. When starting negotiations for a new marketing or advertising solution, the KAM team acquires the necessary knowledge of customer needs and expectations as the basis of the solutions ideation. As the KAM teams were formed of several supplier companies' professionals, they needed to acquire knowledge of each other's offerings as a basis for solutions integration. Keeping up with the current state of the art in marketing and advertising business was also a constant knowledge-acquisition task.

The knowledge flows between several suppliers and customer company representatives constitute a complex network. The purpose of the KAM approach was to manage this complex knowledge integration, as the following quote elucidates: *"It's all coordinated and everything centralized. They [the customers] don't need to make deals with six separate companies and go through everything six times over. It's all much more coherent. They don't have to manage or control anything. We do all that, and more quality and time and cost savings are accrued for the customer."* (Supplier). However, the data showed that the position of a knowledge integrator and being 'close to the customer' were desirable. A representative of a supplier described how the suppliers competed over the position as follows: *"Everyone wants to be in straight contact with customers [i.e. not via the key account manager]. We'd all like to 'own' the customer relationship... Sometimes, even though we've agreed on coordination, somebody overtakes the key account manager. The feeling that someone is holding out on somebody always creates a certain amount of suspicion."* Furthermore, balancing between the richness of idea sharing accomplished through extensive supplier participation and cost-effectiveness was another constant struggle that the studied KAM team faced in business.

4.3.2 KAM team activities in knowledge assimilation

Knowledge assimilation within the business network was a prerequisite for customizing the solution to customer-specific needs. Knowledge assimilation led to a common view of the integrated solution being reached, as in marketing and advertising, the content of the solution is seldom clear in the beginning of the solutions process, but the solution is co-created in the network of supplier and customer representatives.

Knowledge assimilation took place in the form of analysing, processing and interpreting information between suppliers of the KAM teams and between the KAM teams and customers. The KAM team members created a common understanding of their business customers and their strategic needs. The possession of strategic insight into the customer was emphasized in the interviews several times. Everything in marketing and advertising business is based on thorough customer understanding, which was achieved and cumulated in close, long-term cooperation.

The importance of tacit knowledge was pinpointed several times in the interviews. The following quote illustrates the challenge of tacit knowledge in the marketing and advertising business: *“The challenge in our work is that we can’t concretize our competences so that customers grasp the value added. One of the biggest challenges is that we perform miracles but we’re unable to show how we do it... the more creative and customized the direction you’re heading in, the more difficult it gets.”* (Supplier)

One form of tacit knowledge was customer knowledge, which was regarded as something almost impossible to convert into an explicit and thus more easily shared form. However, KAM teams attempted it by analysing their business customers together and making joint interpretations of the customer knowledge acquired. Similarly, they described some of their service concepts, which facilitated knowledge assimilation among the KAM team members and with the customers.

4.3.3 KAM team activities in knowledge application

Within the studied business network, knowledge application led to enhancing the supplier’s own business as well as the business customers’ businesses. The customers received concrete end results such as print or TV advertisements. In addition, the strategic insight provided by the KAM team was regarded as a central result of knowledge application. The studied customers preferred obtaining an outside, neutral view of their business from the KAM team. As the following quote shows, customers greatly appreciated the knowledge concerning new business possibilities: *“Now we know of these various possibilities, we know something we didn’t realize or understand before – the direction in which this world is going.”* (Customer). They even wished for energy and enthusiasm, and suppliers to challenge their own views with new ideas in business development. In other words, it was not only a question of knowledge but also about creating fruitful circumstances of co-creation among all the network actors. Table 9 summarizes the identified KAM activities in knowledge acquisition, assimilation and application:

Table 9. Central KAM team activities in the co-creation of integrated solutions in KIBS (Hakanen, in press).

KAM team activities
<p>Knowledge acquisition</p> <ul style="list-style-type: none"> • Identify the business customer's problem, needs, and value expectations • Become acquainted with the service offerings of suppliers within the KAM team • Analyse the customer's preference for centralized or de-centralized knowledge flows • Define knowledge flows and contact persons for effective coordination • Utilize tools (e.g. IT tools) to integrate the network actors and knowledge flows
<p>Knowledge assimilation</p> <ul style="list-style-type: none"> • Share knowledge of the customer's problem, needs, and value expectations in the KAM team • Make customer knowledge explicit among suppliers where possible • Analyse and interpret customer knowledge to customize the solution to customer needs • Create a common understanding of the contents of the solution within the business network
<p>Knowledge application</p> <ul style="list-style-type: none"> • Enhance the customer's business through offering concrete solutions and strategic insight into the customer's business development • Provide an outsider view and challenge the customer • Promote the spirit of common ideation and co-creation among actors • Present the KAM team as a unified front at the customer interface • Provide expected value for the customer through solutions co-creation

4.3.4 Contributions of Article III

Article III (Hakanen, in press) contributes to the KAM literature by providing an empirical insight into knowledge utilization in solution business in KIBS, while – with a few exceptions (Nätti et al., 2006; Sharma, 2006) – the main proportion of KAM literature focuses on industrial companies (e.g. Hutt & Walker, 2006; Millman, 1996; Millman & Wilson, 1995, 1996; Workman et al., 2003). The study findings also contribute to the solution literature (e.g. Brax & Jonsson, 2009; Hakanen & Jaakkola, 2012; Jaakkola & Hakanen, 2013; Tuli et al., 2007; Windahl & Lakemond, 2006) by providing a new conceptual understanding and empirical insight into KAM teams that operate as knowledge integrators in a business network, together with the influence of the KIBS context on the solutions process.

It was discovered that the central role of tacit knowledge in marketing and advertising was a strength when it concerned thorough understanding of the customer's business and needs and the ability to provide strategic sparring for the customer. On the other hand, the dominant role of tacit knowledge can also hinder the co-creation of integrated service solutions when the actors struggle to find a

common understanding of the content of the solution and the modes of cooperation within the business network. The dominant role of tacit knowledge may also result in perceived uncertainty by the actors with regard to the solution process and value.

The study proposes that the entire solutions process – from sales and ideation to implementation of the solution – builds on knowledge acquisition, assimilation and application in KIBS. The study discovered that in order to find a fit between customer needs and solutions offering, it is important for KAM teams to integrate external knowledge (i.e. customer knowledge) and internal knowledge (concerning the offering). In other words, integrated service solutions require various information processing activities by the actors operating at the customer interface.

4.4 Customer knowledge acquisition in servitization

Strong customer orientation is a key feature of servitization strategies (Baines et al., 2009). However, several industrial companies struggle to identify the customers with most potential to support their strategic aim to proceed in servitization, i.e. to identify those business customers that would purchase services in addition to products.

Article IV proposes that customer knowledge management can be used to enhance customer centricity and servitization of industrial firms (Hakanen et al., 2014). Companies need to acquire in-depth customer-specific knowledge about their business customers and their purchasing behaviour. Although understanding of customers' businesses has constantly been emphasized in the solutions literature, the literature that provides an empirical insight into servitization has not explicitly provided elaborations into exactly what knowledge should be acquired from customers for the purposes of servitization. As a result of Article IV, customer factors that affect the procurement of industrial services were identified (Table 10). These factors are regarded as salient knowledge that suppliers should acquire about their business customers when proceeding with servitization.

The identified factors affecting service procurement were categorized under the following topics: Basic company characteristics, Customer's business, Procurement, and Value expectations. Next, a summary of the findings of the Article IV are presented.

Table 10. Summary of customer factors affecting service procurement (Hakanen et al., 2014).

<p>Basic company characteristics</p> <ul style="list-style-type: none"> • Company size • Organizational culture • Position in value chain
<p>Customer's business</p> <ul style="list-style-type: none"> • Core business • Products and product categorization • Role of manufacturing • Technological competencies • Manufacturing technology • Core and non-core processes • Investment plans
<p>Procurement</p> <ul style="list-style-type: none"> • Outsourcing strategy • Repair and maintenance function • Procurement function • Decision-making process • Purchaser and others involved in decision-making • Background and orientation of the purchaser • Supplier base
<p>Value expectations</p> <ul style="list-style-type: none"> • Benefits and customer experience • Extent and depth of cooperation • Purchasing criteria

4.4.1 Basic company characteristics and customer's business

Basic company characteristics such as the size of the customer company influenced the customer's service purchasing in several ways. Some of the studied customer companies, especially small ones, were eager and capable of repairing and maintaining machines by themselves while bigger ones were more eager to outsource. One important aspect that the suppliers had noticed was that in servitization – such as starting to offer a new kind of service – they might end up competing with their own important customers. They then had to re-evaluate their way of proceeding with servitization.

According to the supplier informants, it was essential to acquire knowledge about the customers' core and non-core processes as companies commonly outsourced the activities that were outside their core business to service suppliers. However, the customers invested in their own repair and maintenance (R&M) function in cases in which they could not afford to risk production downtime and

needed to have the competence in house. The suppliers pursued discussions with the management of customer companies to find out about the customers' plans – how will the customers organize their R&M functions in future, for example.

Knowledge acquisition with regard to customers' technological competencies was considered important in servitization and in searching for new service business opportunities to find where to complement the customer's resources. Additionally, it was beneficial to acquire knowledge about products purchased previously by customers and manufacturing technology, as a very common way to proceed with servitization was to augment the suppliers' own products with services. Customers valued that suppliers had expertise in their own products and eagerly purchased products and services from the same supplier to centralize their purchases.

Suppliers aimed for early involvement in the customers' investment plans and for effecting the manufacturing plans and technological specifications, as this often increased the opportunities of selling their technology and/or services to the customer. However, customers varied in terms of how openly they shared knowledge about their investment plans.

4.4.2 Procurement strategy, function and practices

The studied suppliers perceived that knowledge of the customers' outsourcing strategies was central in evaluating potential to offer services to the customers. The suppliers often proceeded with servitization by taking responsibility for the outsourced R&M work in the customer company. Another matter that was important to find out was the structure of the customers' procurement function, i.e. whether customers had a centralized purchasing function or purchased through different organizational units. The suppliers emphasized the importance of acquiring knowledge about the decision-maker concerning the customers' purchases and mapping the main contact person in the customer's organization. The CEO was typically the decision-maker and main contact in small companies. In large companies, the customers' purchasing organization and the decision-making process were occasionally complex. The suppliers needed to convince several customer representatives in negotiations, such as the procurement manager, production manager and production line employees. Depending on the background and orientation of the customer representative, for example, being technologically or commercially oriented, the suppliers needed to adjust their selling approach. In the change concerning servitization, the counterparts in the customer organization could be different when they purchased machinery from those making decisions to purchase services.

When looking for new service business opportunities, the studied suppliers had also noticed that knowledge about other suppliers that supply a certain customer is beneficial. Although their competitors had the main R&M deal with the customer company, suppliers could offer services that required special expertise to their competitors.

4.4.3 Value expectations and purchasing criteria

The studied customers differed in terms of the value expectations they had of the solutions they purchased. Customers often prioritized price in negotiations, especially for bulk services, but, in cases when a customer needed a certain spare part very quickly, the prize was almost meaningless. Then, the delivery time mattered most. When repair and maintenance services were in the scope, the customers valued trouble-free solutions and reliability, as they demanded an unstoppable manufacturing process. Several customers valued the way that suppliers took responsibility, made their life easy and allowed them to concentrate on their own work. In addition to the easing of their work, some customers especially valued new ideas and suggestions from the suppliers on how to develop, for example, the manufacturing process.

Customers also varied in terms of the kind of cooperation and customer experience they expected. Some customers valued close and long-term cooperation with suppliers, as the suppliers then learned, for example, to adapt their service to the customer's production line. In some cases, the supplier and customer representatives worked as a team on the production line solving problems together. In other cases, customers expected 'invisible' service with the supplier working independently as much as possible and only keeping the customer informed of the most critical issues.

4.4.4 Contributions of Article IV

Article IV (Hakanen et al., 2014) contributes to the servitization literature by increasing the customer centricity of solution business (e.g. Baines et al., 2009; Brax & Jonsson, 2009; Davies et al., 2006; Hakanen & Jaakkola, 2012; Oliva & Kallenberg, 2003; Sawhney, 2006; Tuli et al., 2007; Vandermerwe & Rada, 1988). When customer orientation in servitization concentrates on the changes undertaken in the offering and the customer relationships (Oliva & Kallenberg, 2003), this study proposes focusing *on* the customer and acquiring knowledge *about* customers to increase competitiveness in the solution business. The acquired knowledge can be used in favour of identifying the customers with most potential to purchase services. Key account managers and KAM teams have a central role in the acquisition and assimilation of knowledge.

The novelty value of the findings derives from bridging the previously separate research streams of servitization, key account management and customer knowledge management. As a result, a business customer's outsourcing strategy, manufacturing technology, level of technological competency, procurement function structure and expectations for value and customer experience were identified as central factors affecting the way business customers purchase services. Despite the fact that only industrial product-service bundles were studied in Article IV, the results can be utilized in service-based solution business.

4.5 Activities in co-creating integrated service solutions in business networks

To summarize, product- and service-based integrated solutions were studied from several perspectives in the original articles of this thesis. However, this thesis specifically aims to identify the activities in the co-creation of integrated *service* solutions from the perspective of a supplier that operates as an integrating actor in a business network (RQ2). The findings of the original articles were analysed and the activities identified through the tentative framework of this thesis (Figure 3). Thus, both ‘internal’ (between the suppliers) and ‘external’ (with the customer) activities were identified, as well as the activities on both strategic and functional levels. Figure 7 outlines the identified activities followed by further elaboration.

		Strategic capabilities	
Internal capabilities	<p>Activities</p> <ul style="list-style-type: none"> Identifying the value of co-creating an integrated solution for all the suppliers (I) Identifying and agreeing on the optimal network positions (i.e. integrating actor vs. supplier to an integrating actor) (I, II) Defining the roles and tasks of the suppliers (e.g. sales, planning, implementation) (II) Assimilating and applying customer knowledge for effective sales and solution customization (III, IV) 	<p>Activities</p> <ul style="list-style-type: none"> Defining and describing the value of integrated solutions to the customer (I, II) Acquiring strategic customer knowledge e.g. about outsourcing strategy, purchasing organization, decision-making process, and value expectations (II, III, IV) Allowing ‘one-stop shop’ purchasing for the customer (I, II, III) Applying knowledge and the understanding of customers’ business in strategic sparring with the customer (III) 	External capabilities
	<p>Activities</p> <ul style="list-style-type: none"> Knowledge sharing between the suppliers concerning their service offerings (II, III) Identifying the proper contact persons of the network actors (III, IV) Analysing and sharing knowledge of customer problem, needs, and value expectations (II) Mapping the solutions and knowledge utilization process (II, III) 	<p>Activities</p> <ul style="list-style-type: none"> Organizing the customer interface on front-office and back-office operations (III) Adapting to customers’ preferences for centralized or de-centralized knowledge flows (IV) Customizing the solution through interaction and knowledge utilization (II, IV) Presenting the team as a unified front at the customer interface for seamless customer experience (II, IV) Promoting the spirit of co-creation, common problem-solving, and trust among the network actors (I, II, III) 	
		Functional capabilities	

Figure 7. Identified activities in the co-creation of integrated service solutions in business networks (the numbers in brackets denote the original articles of this thesis).

Solution business is based on a profound understanding of the customers' businesses and needs. When analysing the activities that took place in cooperation between all the network actors in the business network, it was discovered that the acquisition of customer-specific knowledge was an essential strategic-level activity (Hakanen, in press; Hakanen et al., 2014). To increase understanding of the customers' purchasing behaviour, the suppliers acquired knowledge about, for example, the customers' outsourcing strategies, purchasing organizations and decision-making processes (Hakanen et al., 2014). Acquiring and assimilating knowledge about the customers' value expectations was of foremost importance as it built the whole foundation of co-creating integrated solutions – whether a customer is willing to buy integrated solutions or not. The studied customers varied in terms of their willingness to control and manage the network of actors (Hakanen & Jaakkola, 2012). The studied customers needed to be convinced of the value accrued from the integration of various resources and the coordination and 'orchestration' of the network, for which a supplier takes responsibility (Hakanen & Jaakkola, 2012; Jaakkola & Hakanen, 2013).

Agreeing on the network positions between the suppliers – which one is the integrating supplier – is a central activity, as the clarity and supplier's satisfaction on the network positions could affect customer experience and the value accrued to all the network actors in cooperation (Hakanen & Jaakkola, 2012; Jaakkola & Hakanen, 2013). The integrating supplier was in a central role in the network. It operated closest to the customer 'owning' the customer relationship, which was mainly responsible for sales and marketing, and managed the co-creation between suppliers and customers by coordinating and orchestrating the network of actors. In addition to the network positions, the suppliers needed to agree on the role and task division between the suppliers, such as which one, or if all, of the companies should attend in the sales, ideation and implementation phase with the customer (Hakanen & Jaakkola, 2012).

The integrating suppliers were also often the ones that were in the position of providing the customer with business consultancy. Knowledge application in terms of strategic 'sparring' provided the customer with important knowledge about, for example, new business possibilities and the supplier representatives with an excellent learning opportunity (Hakanen, in press). On the other hand, customer knowledge assimilation between the suppliers at strategic level increased the possibilities for the suppliers to plan sales and business together.

In terms of the functional level, one of the most important activities was to integrate supplier and customer organizations at the customer interface. From the suppliers' perspective, it meant deciding the division between work conducted in the front end on the customer interface and on the back end (Hakanen & Jaakkola, 2012). However, when a solution consists purely of services, all the suppliers operate more or less at the customer interface. In order to clarify the management of customer interface operations, the suppliers mapped the solution process and showed in which phases and how interaction between the actors takes place (Hakanen & Jaakkola, 2012). In the knowledge-intensive business, in particular, process mapping may also include tasks and descriptions of what

knowledge is acquired and how it is utilized in different phases of the solutions process (Hakanen, in press). With regard to knowledge utilization, the studied suppliers also found out about the customers' preferences for centralized or decentralized knowledge flows (Hakanen, in press) and the proper contacts in both the suppliers' and the customers' organizations (Hakanen et al., 2014).

Another central finding was how to enable the provision of a seamless solution and coherent experience for the customer from all the suppliers (Hakanen & Jaakkola, 2012; Hakanen, in press). In order to do this, extensive supplier integration was needed when sharing knowledge about the suppliers' common customers and offerings. The suppliers then created a mutual understanding of their common customers and their needs as well as the possible combinations they could form with their various resources. On a functional level, in order to be able to customize the solutions to customer-specific needs, intense interaction and knowledge utilization took place in the course of the solutions process (Hakanen, in press). The customers varied in terms of their willingness to participate in co-creation, though most of them expected and perceived the spirit of ideation and co-creation as well as trust between all the network actors (Hakanen & Jaakkola, 2012; Hakanen, in press).

5. Conclusions

This chapter presents the discussion section and the theoretical contributions drawn on the bases of this study and the original articles of the thesis. It also presents the limitations of this thesis and provides managerial advice and suggestions for further research.

5.1 Discussion

The starting point of this thesis was the notion that the basic characteristics of services, i.e. that they are intangible, relational and interactive in nature (e.g. Edvardsson et al., 2005; Fitzsimmons & Fitzsimmons, 2008), as well as the complexity of doing business in business networks may require new kinds of capabilities of companies, on which the current solutions literature remains silent.

The interactive and relational nature of service and customer participation in value co-creation (Vargo & Lusch, 2008) leads to companies *co-creating* integrated solutions in business networks. When value is not only the concern of the customer, the suppliers also accrue value from the co-creation of integrated solutions, and all the network actors participate in the solutions process from solutions ideation to implementation. Although value co-creation does not always require co-creation (or co-production, Vargo & Lusch, 2008), this study suggests that co-creation enables sufficient hearing of the customer's 'voice' in solution business and effective collaboration within a business network context.

As a result of analysing the identified activities that are central in co-creating integrated service solutions (Figure 7), some of the activities clearly take place between the suppliers or on the customer interface with the suppliers. However, several of the identified activities are interlinked, partly overlapping and hard to define unambiguously as internal or external and strategic or functional. For example, the value perceptions of the suppliers were interlinked with the way customers perceive the solutions offerings (Jaakkola & Hakanen, 2013). On the other hand, customer preferences affect how suppliers are organized and how interaction and knowledge exchange take place within the network and between the suppliers (Hakanen, in press; Jaakkola & Hakanen, 2013). When intense interaction, ideation and problem solving were involved, the supplier and customer

representatives merged into a single, unified whole in the course of the solutions process (Hakanen, in press). In other words, the activities are undertaken in cooperation, leading to blurring of the company and organization unit boundaries. Then, instead of focusing on single internal or external capabilities or on strategic and functional capabilities, coordination between the capabilities is more important. Instead of bundling the solution 'mechanically' by its components, as can be the case in product-based solutions, integrating services in co-creation between the network actors requires integrating supplier and customer organizations. This notion and the observations related to the analysis of the central activities identified in this study lead to the proposal of *organizational integration* as a central capability in the co-creation of integrated service solutions in business networks.

Identification of the organizational integration capability anchors the contributions of this thesis in organization science, in which organizational integration is defined as 'the extent to which distinct and interdependent organizational components constitute a unified whole' (Barki & Pinsonneault, 2005). In this study, organizational components refer to the companies operating within a business network. Organizational integration leads companies to reach unity of efforts (Barki & Pinsonneault, 2005), i.e. operating harmoniously for the common aims and coordinating the activities between the actors. These aspects were identified as central in this study, in which the clarity and level of agreement of the common aims (Hakanen & Jaakkola, 2012) and network positions (Jaakkola & Hakanen, 2013) within a business network influenced how seamless the solution appeared in the eyes of the customer. Organizational integration is then pivotal in terms of achieving a seamless customer experience, with seamless integration being one of the basic characteristic of integrated solutions (e.g. Brax & Jonsson, 2009; Nordin & Kowalkowski, 2010).

While Shepherd and Ahmed (2000) noted organizational integration capability as important, in addition to technical integration, this study develops the concept further conceptually and empirically. While Brax and Jonsson (2009) suggested internal and external integration as a salient capability of a supplier, this study expands the perspective from a supplier-customer dyad to network level and provides empirical evidence on the activities that relate to the organizational integration capability. Key account managers and the KAM teams, for example, are then in a central position as they integrate the suppliers' and customer's organizations (Hakanen, in press).

In the studied marketing, advertising and consulting cases, the co-creation aspect, in which the service solutions were highly customized and primarily based on tacit knowledge, was pivotal among the network actors (Hakanen, in press; Hakanen & Jaakkola, 2012). Within such a KIBS context, knowledge is regarded as the most central integrated resource, and the whole solutions process can be regarded as being based on knowledge acquisition, assimilation and application (Hakanen, in press). The suppliers acquire and assimilate in-depth customer-specific knowledge and share knowledge of their own service offerings with the suppliers (Hakanen, in press; Hakanen et al., 2014). Reflecting on the tentative

framework of this study (Figure 7), integrated solutions are co-created through complex knowledge flows 'internally' between the suppliers and 'externally' with their customers – and at the functional and strategic levels of operations. Thus, in addition to organizational integration capability, this leads to the identification of *knowledge integration capability* as the second central capability in co-creating integrated service and, in particular, knowledge-intensive service solutions in business networks.

The actors perceived uncertainty in the solutions process in KIBS as they could not map the solutions process in detail and define the exact end-result and value beforehand (Jaakkola & Hakanen, 2013). In other words, the highly customized, intangible solution offerings and their co-creation in business networks increased the uncertainty perceived by the actors. Consequently, knowledge integration capability can be traced back to organizational studies and, in particular, to the phenomenon of information processing, according to which the uncertainty of a task increases the need for information processing (Galbraith, 1974). In line with this, the study showed that the more customized and tacit the solution, the more important the creation of a common understanding of the customer need, solutions contents and expected value and customer experience among the network actors (Hakanen & Jaakkola, 2012). Integrating knowledge between all the network actors then becomes essential in co-creating integrated knowledge-intensive service solutions in business networks. It is a prerequisite for answering customer-specific, complex and extensive needs and for utilizing the resources of the actors (i.e. services and knowledge) in the best possible – or even completely new, and creative – way. In practice, a KAM team, for example, may operate as a knowledge integrator on the customer interface (Hakanen, in press; Hakanen et al., 2014). Complementing previous solutions literature, this study addresses the importance of knowledge as a central resource in co-creating integrated knowledge-intensive service solutions in business networks.

The results of this thesis complement the extant studies in solution business, which have already taken a strong relational orientation to solution business in business dyads or business networks (Aarikka-Stenroos & Jaakkola; 2012; Brax & Jonsson, 2009; Skarp & Gadde, 2008; Tuli et al., 2007; Windahl & Lakemond, 2010) but have not elaborated on the required capabilities in service- and knowledge-intensive solution business. However, the suggested organizational and knowledge integration capabilities complements earlier research, which depicts systems integration as the core capability of integrating solutions (Brady et al., 2005; Davies, 2003; Davies et al., 2007). Systems integration capability is without a doubt relevant in bundling products and services or integrating various product components into a functioning system. However, compared with the previous studies on solutions, this study stresses the relationships and interaction between all the network actors (i.e. suppliers and customers) while they integrate and apply intangible resources (e.g. services and knowledge) in business networks. The results of this research essentially draw attention to integrating different organizations and organizational units as well as knowledge when co-creating integrated service and knowledge-intensive solutions in business

networks. Activities such as agreeing on the network positions and sharing knowledge between the network actors are then pivotal in order to ensure successful value co-creation and seamless, positive customer experience (Hakanen, in press; Hakanen & Jaakkola, 2012; Jaakkola & Hakanen, 2013). In other words, the organizational and knowledge integration capabilities ensure long-term orientation and strong customer focus, which are inherent in solution business compared with, for example, more transaction-based project business leaning on temporary organizations (e.g. Turner & Müller, 2003).

However, the emergence of the new capabilities does not suggest that earlier ones should be abandoned, but it provides a new, customer and service-dominant logic (Vargo & Lusch, 2008) oriented view on the management of networked solution business. While the service- and knowledge-intensiveness of solutions are increasing in the practical business world, it is reasonable for the related theoretical perspectives to be cherished in the solutions research. This study also provides an empirical insight into network-level value co-creation in solution business, while current literature mainly discusses the topic conceptually (e.g. Gummesson & Mele, 2010; Lusch & Vargo, 2006; Lusch et al., 2010).

5.2 Theoretical contributions

This study was motivated by the ongoing trends of increasing the service- and knowledge-intensiveness of the integrated solutions, their co-creation in business networks and the lack of related research. The aims of this thesis were to increase the conceptual understanding of the co-creation of integrated solutions in business networks and to provide an empirical insight into the related capabilities and activities. Drawing on the relational view of a firm and the selected perspectives derived from service management, value creation, knowledge management and key account management, this thesis identified how – through which capabilities – a supplier company co-creates integrated service solutions together with several suppliers and their common business customers. The theory synthesis reasoned that in order to gain a competitive advantage in solution business, combining the service- and knowledge-intensive nature of solutions and their co-creation in business networks may result in a need for new kinds of capabilities.

The study relied on qualitative case studies conducted in the industry and the service sector. The empirical data were gathered in the supplier and the customer companies by in-depth interviews (n=101). As a result, this thesis extends and complements the theory by applying various theoretical perspectives on the co-creation of integrated service solutions in business networks and providing a rich empirical insight into the topic from different business fields. The contributions of this doctoral thesis are presented next, in three sections, in line with the research questions of this thesis.

5.2.1 Conceptual understanding of the co-creation of integrated solutions in business networks (RQ1)

As an answer to the first research question, this thesis increases the conceptual understanding of the co-creation of integrated solutions in several ways with the various theoretical perspectives applied in the study. This study conceptualizes the co-creation of integrated solutions that take place in a business network – between several supplier companies and their common customer company – while they integrate and apply resources in interaction (Jaakkola & Hakanen, 2013). Firstly, this thesis concerns value from the perspectives of several network actors – both supplier companies and a customer company in business networks (cf. Gummesson & Mele, 2010; Lusch & Vargo, 2006). Value co-creation hence involves interlinking value processes within organizations, in relationships between actors and within a network of actors. Conceptual understanding is then increased by suggesting that all the network actors – suppliers and customers – perceive benefits and sacrifices (cf. Ravald & Grönroos, 1996) in co-creating integrated solutions in business networks (Jaakkola & Hakanen, 2013).

Secondly, this study proposes that solutions be regarded as service processes characterized by interaction and co-creation from the customer's perspective (Hakanen & Jaakkola, 2012). By applying a service concept framework in the study of integrated solutions, this thesis bridges the theoretical domains of solutions literature and service management literature. The conceptual elaborations of this study support the view of previous research on solutions – in addition to that of the supplier – from the customers' perspective, and considers them as relational, interactive and intangible processes rather than bundles of product and service components (Brax & Jonsson, 2009; Storbacka, 2011; Tuli et al., 2007). On the other hand, this thesis conceptually complements previously goods-dominant logic oriented solutions literature (e.g. Davies et al., 2007; Kapletia & Probert, 2010; Matthyssens & Vandenbempt, 2008; Oliva & Kallenberg, 2003) with a more service-dominant logic oriented mindset being inherently customer focused and relational (Vargo & Lusch, 2008). Co-creation involving participation by several actors is then pivotal. Consequently, the identified organizational integration capability underpins the contributions of this thesis conceptually to organization science (Barki & Pinsonneault, 2005) in addition to the solutions literature.

Thirdly, this study develops our conceptual understanding of the co-creation of integrated knowledge-intensive service solutions. Knowledge utilization in business networks is then conceptualized as taking place inside a company, in dyads between companies and at business network level. As a conceptual contribution, this study is among the first to address the role of knowledge and identify the knowledge integration capability as central in integrating knowledge-intensive service solutions in business networks. This study then introduces information-processing theory (Galbraith, 1974) into the research on integrated solutions.

Fourthly, as one of the first studies within the solutions domain, this study applied key account management (Guesalaga & Johnston, 2010; McDonald et al., 1997; Zupancic, 2008) and customer knowledge management (García-Murillo & Annabi, 2002; Gebert et al., 2003; Nätti et al., 2006) in solution business. The study increases conceptual understanding of the co-creation of integrated solutions by proposing customer knowledge management as an approach that could enhance customer focus in the servitization of an industrial company (Hakanen et al., 2014). The factors that affect business customers' service purchasing are central customer knowledge acquired by suppliers. This knowledge can be used in focusing service sales and development on the business customers with most potential as well as in developing customer relationships and offerings according to customer expectations. KAM teams serve as an example of customer-facing, boundary-spanning actors in a central role with regard to organizational and knowledge integration in service- and knowledge-intensive solution business.

5.2.2 Activities in the co-creation of integrated service solutions in business networks (RQ2)

To answer the second research question, this study provides in-depth empirical evidence on how integrated service solutions are co-created in business networks through the identification of the central activities from both the suppliers and customer perspectives (Figure 7). By widening the perspective from the customer focus in business dyads, this thesis provides empirical insights into how several suppliers, together in a network context, could increase their customer orientation in solution business (Hakanen et al., 2014; Hakanen & Jaakkola, 2012). This study strengthens customer focus on networked solution business and contributes to the solutions literature by studying customers' perceptions as well as those of a set of suppliers at a time when such empirical observations are relatively rare in the domain (Aarikka-Stenroos & Jaakkola, 2012; Brax & Jonsson, 2009; Skarp & Gadde, 2008; Tuli et al., 2007; Windahl & Lakemond, 2006). In addition, while most of the solutions literature studies product-service bundles (e.g. Davies et al., 2007; Kapletia & Probert, 2010; Matthyssens & Vandenbempt, 2008; Oliva & Kallenberg, 2003), leaving studies exclusively on service solutions in a clear minority (Aarikka-Stenroos & Jaakkola, 2012; Tuli et al., 2007), this study investigates the activities concerning co-creating service solutions in business networks.

The service and value creation perspective diverts attention, especially to the activities related to organizing customer interface operations, creating a seamless customer experience and defining and describing the value accruing for the customer from the integrated service solution (Hakanen & Jaakkola, 2012; Jaakkola & Hakanen, 2013). Furthermore, agreeing on the optimal network positions within a business network and defining the roles and tasks of the suppliers in solutions sales, planning and implementation were identified as

central activities. These findings regarding the network position of network actors support the empirical findings of Windahl and Lakemond (2006), although they studied product-service bundles instead of service solutions and did not link network positions and customer experience in solution business.

Another application of the service perspective took the form of studying business networks that co-created knowledge-intensive business services (KIBS). Key account managers and KAM teams were identified as central actors in the co-creation of integrated solutions in business networks. When analysing their activities, KAM teams essentially allow the customer to buy integrated solutions with the 'one-stop shop' principle. They centralize complex knowledge flows and 'orchestrate' the network of suppliers and customers. They link the right counterparts of several organizations in solutions co-creation (Hakanen et al., 2014). Earlier solutions literature has identified the role of KAM and knowledge in solutions business based mostly on product-service bundles (e.g. Storbacka, 2011). However, this study extends the solutions literature by providing in-depth empirical elaboration on the KAM team activities in knowledge acquisition, assimilation and application in a business network. Accordingly, this study identified knowledge integration capability as central to KIBS, hence complementing the previously identified important capabilities in integrating solutions (e.g. Brady et al., 2005; Brax & Jonsson, 2009; Davies, 2003; Shepherd & Ahmed, 2000; Skarp & Gadde, 2008; Storbacka, 2011), which have not elaborated knowledge integration conceptually nor empirically in KIBS networks.

In accordance with, for example, Brax and Jonsson (2009), who emphasized the need to learn more about the customer's strategy and processes in the manufacturing industry, this study identified the activity of the acquisition of in-depth, customer-specific knowledge, but unlike previous authors, in the co-creation of integrated *service* solutions (Hakanen et al., 2014). This study provides a rich empirical insight into exactly what knowledge is important to acquire about customers when aiming to be customer-centric and to proceed with servitization. That is, for example, knowledge about customers' outsourcing strategy, decision-making process and value expectations (Hakanen et al., 2014).

When analysing the co-creation of integrated solutions in marketing, advertising and consulting, the role of tacit knowledge was identified as important in the work of KAM teams (Hakanen, in press). In some cases, tacit knowledge can be presented in explicit form, but the close interaction between the KAM team members originating from different supplier companies is of great importance. It helps to diminish uncertainty that the actors may perceive with regard to solution process and outcome. The creation of a common understanding between the business customers and the supplier companies requires time, long-term orientation in business relationships and trust between the KAM team members and the customer representatives. However, the study results will remind companies of the constant balancing between openness in knowledge sharing and protecting confidential knowledge and their business core. Empirical insights into the co-creation of integrated service solutions contribute to the literature on key account management as well as solutions literature.

In addition to solutions literature, this thesis contributes to the domain of the IMP Group (e.g. Mäenpää et al., 2010; Oinonen & Ryyänen, 2013; Pekkarinen et al., 2008; Salle et al., 2007) by identifying the central activities in co-creating integrated service solutions and thus complementing the current emerging research on the topic.

5.2.3 Organizational integration and knowledge integration capability (RQ3)

As an answer to the third research question of this thesis, organizational integration and knowledge integration capabilities were identified as the central capabilities when a supplier, an integrating actor of a business network, co-creates integrated service solutions with its partners and business customers in business networks (Figure 8). The new capabilities emerged as a result of knowledge-intensiveness of the solution and intangible, interactive and relational nature of service. Uncertainty (cf. Galbraith, 1974) that the network actors may perceive in co-creating such complex and intangible offerings reasons a need for the identified capabilities. Companies need to acquire a common understanding of the customer needs and the solution between the suppliers and with the customer.

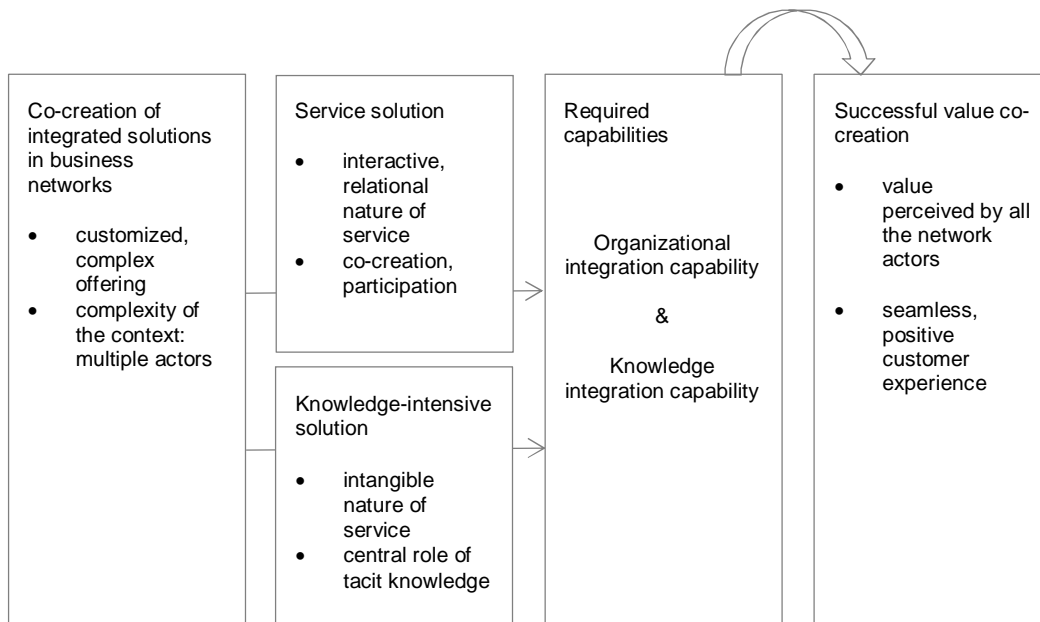


Figure 8. Organizational and knowledge integration capabilities in the co-creation of integrated service solutions in business networks.

Organizational and knowledge integration capabilities enable the co-creation of customized, seamless service and knowledge-intensive solutions for customer-specific needs, offering more value for the customer than the parts of the solution alone (cf. Brady et al., 2005; Davies et al., 2007; Nordin & Kowalkowski, 2010; Tuli et al., 2007). Integrated solutions then accrue value for customers through a more extensive resource constellation on customer needs and easier purchasing with the 'one-stop shop' principle when an integrating supplier taking responsibility for the network coordination (Jaakkola & Hakanen, 2013). Successful organizational and knowledge integration also leads the customer to receive a seamless solution when all the network actors agree on their network positions, the content of the solution and how the solutions process proceeds (Hakanen & Jaakkola, 2012; Jaakkola & Hakanen, 2013). In practice, the capabilities are firstly required from the integrating supplier, although successful value co-creation requires every actor's contribution.

The identified new capabilities complement the previous solutions literature and the outlined capabilities (Brady et al., 2005; Brax & Jonsson, 2009; Davies, 2003; Davies et al., 2006, 2007; Miller et al., 2002; Shepherd & Ahmed, 2000; Skarp & Gadde, 2008; Storbacka, 2011; Tuli et al., 2007; Windahl & Lakemond, 2006). As the majority of the solutions literature observes product-service bundles and the related capabilities from the perspective of a single company or in business dyads, this study contributes by providing insights into solution offerings consisting merely of services that are co-created within the business network context. This thesis especially complements the previously identified core capability of systems integration (Brady et al., 2005; Davies, 2003; Davies et al., 2007) in bundling products and services with the relational and interactive co-creation aspect in integrating services and knowledge in business networks. As a consequence, this study introduces more of an SDL-oriented mindset (Lusch & Vargo, 2006; Vargo & Lusch, 2008) to integrated solutions. The identified capabilities required in a business network also contribute to the service management literature by complementing prior research in KIBS, which has identified central capabilities at a company level (e.g. Ritala et al., 2013).

Organizational and knowledge integration capabilities remove the focus from the transaction-oriented capabilities related to production or bundling the offering towards the relational capabilities needed in the business network. In the continuum of the required capabilities related to different value creation modes (Möller & Törrönen, 2003), organizational and knowledge integration capabilities draw attention to the relationship and network capabilities as well as the capabilities related to mastering customer's business, which are connected to the value co-creation mode that is sparsely addressed in the solutions domain. Overall, the service- and knowledge-intensiveness of the solutions diverts attention to the downstream direction of the company – to the customer interface where all the company representatives collide and interact with each other.

In addition to making the main research contributions to the solutions literature, this thesis contributes to the organization science, strategic management, and services marketing and management literature, and, in particular, to the studies

conducted in a service network context (Evanschitzky et al., 2007; Jones et al., 1998; Syson & Perks, 2004). For example, this thesis complemented the study of Syson and Perks (2004) conducted in consumer services with the business-to-business perspective in solution business. In line with Jones et al. (1998), this study elaborated the dominant role of tacit knowledge in KIBS but complemented prior organization studies by studying service-based solution business in business networks. While Evanschitzky et al. (2007) identified the knowledge management process in knowledge-intensive service networks, this thesis complemented strategic management literature by studying the role of knowledge and its utilization in a solution business context.

5.3 Managerial implications

This study provides new knowledge for company managers, especially, on how to integrate service solutions successfully within a group of supplier and customer companies. The activities that were identified as central in the co-creation of integrated service solutions serve as a managerial guideline that companies can utilize in their business development (Figure 7). The co-creation aspect related to service and knowledge-intensive solutions draws attention to the management of the customer interface, where all the supplier companies interact with the common customer. Accordingly, this study encourages companies to increase customer focus not only from a single firm's perspective but also when operating with partners for the purpose of serving a common customer. This study then promotes the focus on customer value, customer experience and customer knowledge utilization within a business network.

First of all, this study encourages companies to pay attention to the value that integrated solutions accrue for customers. This study remarks that the value accrues for the customer through the combination of various products and/or services fulfilling customers' extensive needs and/or through the integration work for which a supplier takes responsibility within a business network. However, business customers vary in terms of their willingness to purchase integrated solutions, and they seek for different benefits. Sometimes, the customers want to integrate the solution and 'orchestrate' the network of actors by themselves and sometimes they outsource the coordination work to one of their suppliers. To reach a thorough understanding of customers' business, operations and value expectations, companies are encouraged to analyse their business customers and to utilize that knowledge among several suppliers in networked solution business. For example, the key account management (KAM) unit is in a central position to acquire this sort of knowledge about the customers. They are familiar with the customers' business, organization and changing needs and possess the best knowledge of how the sales efforts should be focused when the company's aim is to increase sales of larger entities and integrated solutions.

The study findings indicate that acquiring a common understanding and agreement of the suppliers' network positions by the actors is another prerequisite

for successful network cooperation. To ensure a seamless and positive customer experience, supplier companies need to decide clearly and agree on which one of the suppliers should operate as the integrating actor. It is especially confusing for the customer, leading to a negative customer experience, if the customer notices that suppliers provide conflicting knowledge and views or, in the worst case, compete with each other. The core value proposition of integrated solutions is then jeopardized when the suppliers do not appear as a seamless unit. However, this study is a reminder that companies can do profitable business in various network positions. Every network position accrues benefits and sacrifices for suppliers, and the most important thing is to evaluate within companies in which network they operate and which position is suitable for them in different networks. After all, all companies operate simultaneously in several business networks and their positions in them vary. From an integrating supplier's point of view, they should make the cooperation attractive to potential partners. It requires identification of how the cooperation and co-creation of integrated solutions benefit all the suppliers. On the other hand, suppliers may, for example, perceive risks of cooperation, such as leaking of confidential business knowledge or mistrust between the partners. Consequently, the suppliers should look for ways to diminish the perceived sacrifices together in terms of cost, effort and risk associated with cooperation. The prerequisite for successful co-creation of integrated solutions in business networks is then established: Every actor is motivated to cooperate by the perceived value of cooperation.

To promote customer and service orientation, this study applied a service concept framework in the study of integrated solutions (Hakanen & Jaakkola, 2010; Hakanen & Jaakkola, 2012). It defines and describes the service concept in terms of the core solution, service operations and processes, customer experience and the outcome for the customer, as well as the value for all the network actors (i.e. suppliers and the common customer) (Figure 9).

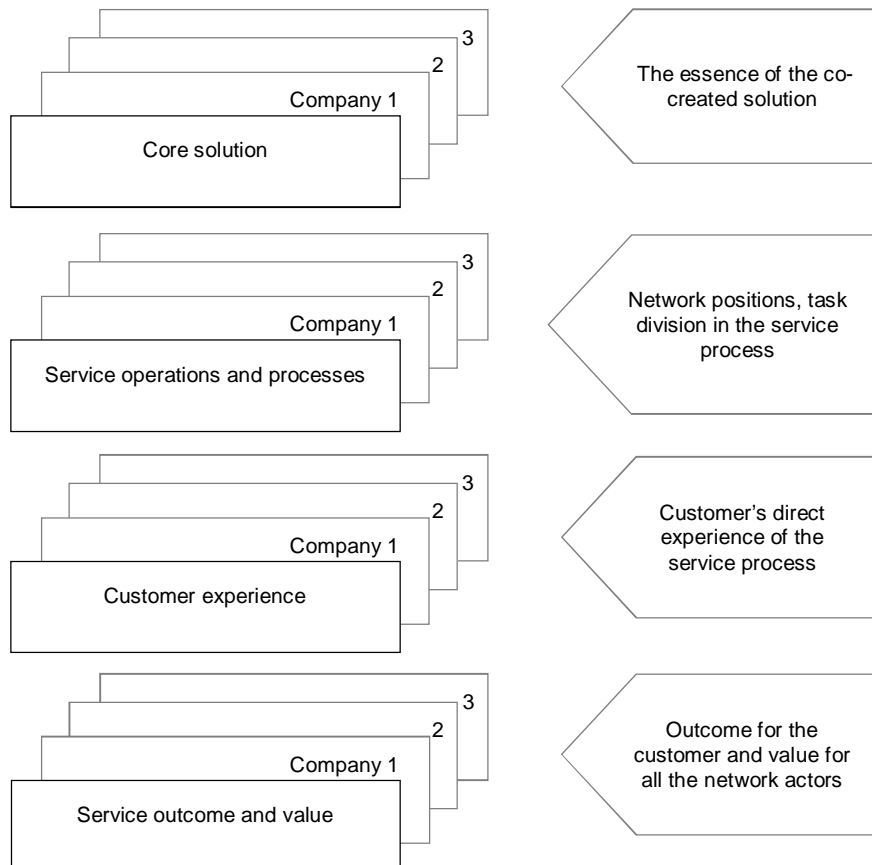


Figure 9. Framework of a jointly created service concept (modified from Hakanen & Jaakkola, 2010).

The more customized an intangible solution is, the more common ideation and knowledge sharing the solutions process may require among all the network actors. The service concept framework serves as a tool to facilitate common solutions design, definition and sales. It is essential to align all the elements of the service concept in cooperation between the suppliers and customers within the network context. For service solutions comprising intangible services and knowledge, the service concept framework helps to revise tacit knowledge into an

explicit form. It then facilitates the creation of a common understanding of the solutions content, process and value for all the network actors.

Although the focus of this thesis is on services and knowledge-intensiveness, this study does not aim to build even higher boundaries between product- and service-oriented business; the perspectives and findings of this study are also applicable to product, manufacturing and technology-oriented businesses. After all, the importance of services and knowledge-intensiveness is constantly growing in all industries, and stronger customer-focus, on which this study provides insight and advice, is beneficial to all business.

5.4 Limitations and suggestions for further research

Like all research, this has its limitations, part of which may offer interesting future research avenues. This thesis applied the perspectives of value creation, service management, knowledge management and key account management to the study of integrated service solutions co-creation in business networks. Although this study provided in-depth empirical insight into the phenomenon, this research merely opened the discussion along with a few other scholars regarding service solutions, their intangible, interactive and relational nature and the related implications for solution business (e.g. Aarikka-Stenroos & Jaakkola, 2012; Tuli et al., 2007). When regarding such well-established research areas as service management and knowledge management, the vast and complex phenomenon was studied from rather narrow theoretical perspectives in this study. The selected literature presents several theories and theoretical frameworks through which the phenomenon could be studied in more depth. For example, the service concept framework applied from the service management literature (Hakanen & Jaakkola, 2012) represents only one of several possible approaches and frameworks from the service literature.

This study was based on the relational view of a firm mainly focusing on the resource integration and knowledge sharing in business relationships. In addition, for example, transaction cost theory could be utilized in studying networked co-creation of integrated solutions. Then, for example, coordination costs that the solutions integration causes could be calculated. More knowledge could be created on the economic basis for selecting the integrating actor – whether one of suppliers or a customer company operates as an integrating actor in a business network. Then, outsourcing of integration work in solution business could be further analysed. Consequently, the addressed limitations open up further research avenues by suggesting application of various theories to the studies of service solutions co-creation in business networks and consequently deepening both conceptual and empirical understanding of the topic.

This study identified the central activities in the co-creation of integrated service solutions (Figure 7) based on the four original articles of this thesis. However, one possible limitation of this study is that some activities did not emerge from the data collected in the limited number of cases and companies. For example, contracts

are essential in business relationships, but they did not appear as a central issue in the interviews. Future research on service solutions could therefore either validate the research results of this research or complement them with other identified activities. All the identified activities of this thesis could also be subject to in-depth elaboration, especially those that the informants regarded as most challenging, such as concretizing and convincing the customer of the value of the integrated solutions. Thus, future research could attempt, for example, to address the value of the integration and coordination work also by calculating the value in monetary terms.

This study identified organizational and knowledge integration as the central capabilities in co-creating integrated KIBS solutions in business networks. There are undoubtedly several other central capabilities in co-creating integrated service solutions. As the emergence of the organizational integration in this study is based on the interactive and relational nature of highly customized services, it could also be questioned whether all services require organizational integration or, rather, to what extent different services require it. After all, not all services, such as some self-services or ICT services, require intense interaction between the actors. The contents of some solutions may be clear and gaining of a common understanding of the solutions content is clear-cut and easy. Then, some other capabilities may play a more important role than organizational integration. Applying different theoretical perspectives to studying solutions co-creation may also result in the emergence of various capabilities. These observations may lead to more research on the integration of different services and theoretical perspectives being applied to identify capabilities required by successful service co-creation. The contributions of this thesis underpinned organizational integration (cf. Barki & Pinsonneault, 2005) and information processing theory (Galbraith, 1974), but more research is called for, for wider applications of these theories within the research on integrated solutions. It would be beneficial to study, for example, how companies could diminish the uncertainty in a business network due to the intangible nature of the solution.

Another limitation of this study concerns the selected cases and the transferability of the results. This thesis concentrated on industrial services and KIBS services in marketing, advertising and consulting. Since statistical generalization is not the purpose of qualitative research (Yin, 2003), this study provides results that are highly likely to be transferable to contexts similar to the one studied in this thesis. However, the characteristics of different services and the contexts may affect the co-creation process and thus influence which activities and capabilities are recognized as central. As this was among the first studies in the solutions literature conducted in the service sector, more research is called for to elaborate how integrated service solutions are integrated in various service businesses. After all, not all KIBS, for example, are alike. In addition to marketing and advertising, central co-creation activities and capabilities could be identified in, for example, ICT or in legal and financial consultancy. The way in which this study addressed the importance of knowledge acquisition, assimilation and application within the business network opens the way for knowledge utilization to be studied

in several contexts and businesses. In addition to industrial services and KIBS, this thesis may inspire research on various support services and public services. Longitudinal studies and studies of different business networks – varying in, for example, structure, depth of cooperation or openness in relations to its environment – could provide more interesting insights into the topic.

As pinpointed in this study, despite the rise of service- and knowledge-intensiveness in the economy, solutions literature remains largely industry and product oriented. This study therefore calls for more empirical research in the spirit of service-dominant logic (Lusch & Vargo, 2006; Vargo & Lusch, 2008) and for the spread of the results of this study to product- or manufacturing-oriented companies. As this study concludes that all solutions entail a strong service aspect, it motivates testing of the findings and application of the approaches to the study of product-service bundles and companies proceeding in servitization (cf. Baines et al., 2009; Vandermerwe & Rada, 1988).

Another interesting future research avenue was opened up by applying the KAM approach in this thesis. In addition to the KAM team, other boundary-spanning actors and activities could be studied on the customer interface and in the downstream network. Interesting research questions may then concern, for example, how companies manage and organize their sales and distribution networks and how value creation occurs in downstream networks. Finally, because this study has provided a conceptual understanding and empirical insight into the co-creation of integrated solutions through qualitative research, future research could continue studying the topic of this thesis under quantitative research.

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Appendix A: Outline of the interview themes

Supplier interviews

Background information

- Personal background of the interviewee
- Basic information of the company, e.g. products, services, key customers, competitors

Solution business

- Solution offering: solution components, products, and services
- Level of customization
- Benefits of the solutions for customers
- Future aims in solution business

Solution sales and implementation

- Sales organization, arguments and process
- Solutions implementation, phases of the process, knowledge utilization
- Internal challenges and development needs in solution business

Supplier network

- Central suppliers, history of cooperation
- Suppliers' role and tasks
- Benefits of the cooperation for the suppliers
- Cooperation practices
- Challenges and development needs in cooperation

B2B customer relationships

- Basic information of the customer companies
- History and evolution of the customer relationships
- Depth of the customer relationships
- Customers' role in solution sales and implementation
- Differences between customers and their purchasing process and behaviour
- Cooperation and common development practices
- Challenges and development needs in customer relationships

Customer interviews

Background information

- Personal background of the interviewee
- Basic information about the company, e.g. products, services, key customers, competitors

Solutions process and supplier relationships

- History and evolution of the business relationship
- Purchasing organization, practices and behaviour
- Purchasing criteria
- Purchased solutions
- Level of the solution customization
- Participation and customers' role and tasks in solution implementation
- Cooperation and common development practices
- Customer experience
- Customer-perceived benefits of integrated solutions
- Customer-perceived sacrifices of integrated solutions
- Challenges in cooperation with the supplier
- Future directions and development needs in cooperation

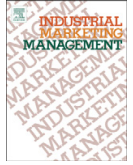
ARTICLE I

Value co-creation in solution networks

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Value co-creation in solution networks

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ABSTRACT

Despite high expectations attached to solution business, research on its value outcomes to the actors involved remains scarce. By drawing on rich empirical data, value research, and the interaction and network approach, this paper studies how value is co-created in solution networks. We explore how actors integrate resources in interaction to develop integrated solutions, and identify the related benefits and sacrifices perceived by each actor in two different solution networks. The study identifies potential linkages between the value processes of actors and their wider network, and postulates that the type of the resources integrated may be an antecedent to certain benefits and sacrifices. This paper contributes to solutions research by providing a new conceptual understanding of value co-creation that occurs in the interplay of actors, resources and activities in solution networks.

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1. Introduction

The rising trends of outsourcing, specialization, and knowledge intensiveness prevalent in many industries have led customers to centralize their purchases and seek suppliers that can provide more extensive offerings or solutions (Davies, 2004; Möller, 2006; Stremersch, Wuyts, & Frambach, 2001). This has encouraged suppliers to develop “integrated solutions”, bundles of products and/or services that meet customer specific needs and are assumed to offer greater potential for value creation than the individual components would have alone (e.g., Brady, Davies, & Gann, 2005; Davies, Brady, & Hobday, 2007; Evanschitzky, Wangenheim, & Woisetschläger, 2011; Nordin & Kowalkowski, 2010; Tuli, Kohli, & Bharadwaj, 2007). Despite high expectations attached to solutions business, research on its value outcomes to the actors involved remains scarce. This is surprising given the pivotal importance attached to value within the marketing domain. Value creation is considered a key research priority for academics and practitioners alike (Ostrom et al., 2010), the central means through which to gain competitive advantage in the marketplace (Woodruff, 1997), and even the core purpose of economic exchange (Vargo, Maglio, & Akaka, 2008).

The contemporary perspective indicates that value emerges when actors integrate and apply resources in interaction with other actors (Gummesson & Mele, 2010; Lusch, Vargo, & Tanniru, 2010; Vargo & Lusch, 2011), and is subjectively determined on the basis of the benefits

and sacrifices perceived in the processes or outcomes of interaction (cf. Ravald & Grönroos, 1996). In extant research on solutions, the value of developing and providing solutions is discussed at a rather general level, primarily related to the benefits of servitization. Most authors refer to the potential to improve the manufacturer’s competitiveness and profitability by “upgrading” the core product offering with customized services (Matthyssens & Vandenbempt, 2008; Nordin & Kowalkowski, 2010; Skarp & Gadde, 2008). From the customer perspective, the value of solutions is assumed to relate to the integration of resources into a seamless package (Brady et al., 2005; Brax & Jonsson, 2009). With rare exceptions (Macdonald, Wilson, Martinez, & Toossi, 2011; Skarp & Gadde, 2008; Stremersch et al., 2001; Tuli et al., 2007), very few empirical investigations into customer perceptions on solutions have however been conducted. Little is therefore known about how customers actually respond to suppliers taking charge of selecting and integrating the resources composing the solutions, or how integration affects customer perceived value (cf. Evanschitzky et al., 2011). Overall, the value implications of more extensive resource integration, i.e. integrating different components into a “total solution”, are not sufficiently understood.

Furthermore, studying value creation from the perspective of the focal solution provider and the customer provides only a limited understanding, because the development of integrated solutions typically involves resource integration by multiple actors (Cantù, Corsaro, & Snehota, 2012; Cova & Salle, 2008; Möller, 2006; Windahl & Lakemond, 2006). The study by Cantù et al. (2012) indicates that a solution is not a given set of resource elements, but an ongoing accomplishment based on interactions among the actors involved. Furthermore, the nature of collaboration between the actors providing the resources comprising the solution has been found critical to solution outcomes (Davies, 2004;

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Tuli et al., 2007), as relationships within a firm and with its external partners can both enable and obstruct solutions development (Windahl & Lakemond, 2006). Nevertheless, previous studies on solutions have not focused exclusively on investigating how value creation occurs at the level of the network of multiple suppliers and their customer, or investigated empirically the perceptions of all the actors involved in a specific solution network. Therefore, how value is co-created in the interplay of relationships between actors collaborating to develop solutions is largely unexplored.

To address this gap, this paper studies how value is co-created in solution networks. We explore how actors integrate resources in interaction to develop integrated solutions, and identify the related benefits and sacrifices perceived by each actor in two different solution networks: a knowledge intensive service solution, and an industrial service solution that is a product-service bundle. The theoretical point of departure for the study is that interaction and resource integration between actors is the primary characteristic of business, and the creation of benefits valued by actors necessarily involves two or several counterparts (Baraldi, Gressetvold, & Harrison, 2012; Ford, 2011; Håkansson et al., 2009; Lusch & Vargo, 2006; Lusch et al., 2010; Vargo & Lusch, 2011). We use the term *solution network* to denote the set of actors, i.e. the multiple suppliers and the customer, that are connected to each other for the purpose of integrating their resources to co-create value through solutions. We define *integrated solutions* as offerings that integrate product and/or service components provided by multiple actors to meet the needs of a specific customer or type of customer (e.g., Brady et al., 2005; Davies et al., 2007; Miller, Hope, Eisenstat, Foote, & Galbraith, 2002; Nordin & Kowalkowski, 2010; Tuli et al., 2007).

Solutions are investigated within several, partly overlapping research streams. Kapletia and Probert (2010) divide the literature on solutions into streams focusing on 'migration from products to solutions' and the 'management of solutions'. Storbacka (2011) identifies the following research streams: servitization literature, solution marketing and sales literature, solution strategy and management literature, and operations management-oriented product/service systems literature. Within solutions literature, our study mainly contributes to the stream of solution marketing research (e.g., Cova & Salle, 2008; Sawhney, 2006; Tuli et al., 2007) by providing a new conceptual understanding of value co-creation that occurs in the interplay of actors, resources and activities in solution networks. This is accomplished by drawing on rich empirical data, value research, and the interaction and network approach that offers conceptual frameworks and a rich empirical research base to study interaction within business networks.

The paper is organized as follows. The next chapter provides the theoretical basis for the study by developing the theoretical framework that integrates the literature on solutions, interaction and value creation in the network context. The following section presents the methodological approach and describes the two studied cases. The findings report how actors integrate resources and how that translates into perceived value for each actor in two different solution networks. The final chapter discusses the new knowledge derived from the study results, and provides conclusions and implications.

2. Value co-creation in solution networks: a theoretical framework

2.1. Perceived value of solutions

In marketing literature, value is commonly defined as being derived from the benefits and sacrifices perceived by the actor in the offering and the related exchange (e.g. Eggert & Ulaga, 2002; Lindgreen & Wynstra, 2005; Ravald & Grönroos, 1996). The benefits relate to the practical and emotional utility of the offering (Huber, Herrmann, & Henneberg, 2007), resulting from the performance of the product or service (Whittaker, Ledden, & Kalafatis, 2007) and the relationship

and interaction between the parties (Ravald & Grönroos, 1996). Sacrifices include the monetary costs that customers invest to acquire the product/service or to maintain a relationship with the supplier (Lapierre, 2000), and the associated non-monetary costs such as risk or the invested time and effort (Huber et al., 2007; Ravald & Grönroos, 1996). Traditionally, value research has been preoccupied with the value perceived by the customer, and the value experienced by suppliers and other actors in the service system is largely overlooked (Gummesson, 2008; Songailiene, Winklhofer, & McKechnie, 2011).

In the solutions literature, the *value of solutions for customers* is usually described at a rather general level, such as a "better or easier life for the customer" (Miller et al., 2002), "solving the end customer's problem" (Sawhney, 2006), or "satisfying customer needs" (Tuli et al., 2007). The principle assumption is that integrating separate into a seamless package provides the customer with more value than would the components alone (Brax & Jonsson, 2009). Much of the solutions research relies on suppliers' perceptions of the value that their customers could accrue. For example, Brady et al. (2005) remark that solutions providers can assume the responsibility and risks involved in executing activities previously conducted in-house by their customers, and Miller et al. (2002) suggest that integrated solutions could accrue benefits in the form of superior or simplified operations, cost savings, performance guarantees, convenience, customized services, and state-of-the-art offerings. The sacrifices related to purchasing solutions would concern the increased cost of the solution, and non-monetary sacrifices such as the distribution of risk between the suppliers and customers, and the risk of information leaking to competitors (Brady et al., 2005).

Empirical investigations on customers' value perceptions are rather scarce in the solution domain. Tuli et al. (2007) discovered that customers evaluate factors that impact the relational processes of solution creation, and ultimately the extent to which the solution meets customer needs. According to Stremersch et al. (2001), customers consider performance improvements and reduced costs the most important attributes in a solution supplier's offering. A study by Macdonald et al. (2011) indicates that customers assess the supplier's strength in accessing and employing the resources of other suppliers; i.e. the quality of resource integration on their behalf is a source of value to the customer. Similarly, Skarp and Gadde (2008) demonstrated that interaction among resources across organizational boundaries is required to realize the value of a product-service bundle.

Research explicitly investigating *solution suppliers' value perceptions* is rare. Studies abound addressing the benefits of servitization, but they do not reveal how more extensive resource integration on the customer's behalf creates value for suppliers. Miller et al. (2002) remark that while solution suppliers perceived benefits such as expanded margins and volumes, stabilized revenues, competitor differentiation, and cross-selling opportunities; providing solutions may also lead to unprofitability for the suppliers. Nordin, Kindström, Kowalkowski, and Rehme (2011) examined the sacrifices related to providing solutions, and found that extensive customization and bundling increase operational complexity, which is perceived as a source of risk by the supplier.

2.2. Value co-creation in solution networks

As pointed out by Grönroos and Helle (2010), value for the customer and value for the supplier are predominantly discussed and analyzed as separate phenomena. According to the traditional perspective, value is created by one party and consumed by another (e.g., Anderson & Narus, 2004; Mizik & Jacobson, 2003). However, contemporary marketing literature has increasingly abandoned this perspective, instead considering value as a jointly created phenomenon that emerges in interaction, through integration of resources between actors (Grönroos & Helle, 2010; Gummesson, 2008; Vargo & Lusch, 2008; Vargo et al., 2008). According to the service-dominant logic viewpoint, actors are connected through value propositions which are "reciprocal promises

of value, operating to and from suppliers and customers seeking an equitable exchange" (Ballantyne & Varey, 2006, pp. 334–335). Similarly, the interaction and network approach acknowledges that all business enterprises are simultaneously suppliers and customers (Ford, 2011), as each actor seeks and contributes resources through relationships (Cantù et al., 2012). The traditional supplier–customer division therefore becomes redundant (Vargo & Lusch, 2011).

Recent contributions note that value co-creation processes inevitably involve a number of diverse stakeholders who form networks in which resources are integrated and applied through interaction (Davies, 2004; Gummesson & Mele, 2010; Kothandaraman & Wilson, 2001; Lusch et al., 2010). However, research on the systemic and synergistic effects of value co-creation is only emerging (cf. Lusch et al., 2010; Vargo et al., 2008). How exactly resource integration accrues value in a network context is therefore better elaborated with an interaction based framework that considers interaction between companies as the primary means for them to combine their activities and resources, and the mechanism through which resource benefits flow between companies (Håkansson et al., 2009, pp. 28).

According to the Actors–Resources–Activities (ARA) model, companies can be linked in three interconnected layers: via activity links, resource ties and actor bonds, which affect and are affected by the constellation of resources, patterns of activities and web of actors in the wider network (Ford & Mouzas, 2010; Håkansson & Snehota, 1995). Each actor involved has a perspective on the sacrifices they are willing to invest, and expectations of the benefits they will acquire in the interaction (Håkansson et al., 2009, pp. 28). In this study, the ARA model functions as a framework to study how interaction connects resources over multiple organizational boundaries in a larger network (Håkansson et al., 2009, p. 67), which is the underlying mechanism in value co-creation within networks (Gummesson & Mele, 2010).

Actors are individuals or groups, such as organizations, that control resources and execute activities (Håkansson & Johanson, 1992). Actor bonds are links developed between individuals, characterized by trust, a sense of closeness, appreciation and perceived commitment, that influence and are influenced by resources and the activities through which the resources are integrated (Håkansson et al., 2009, p. 34). Based on its connections to other actors, each actor occupies a distinct network position, which describes its portfolio of relationships and the rights and obligations that go with it (Abrahamsen, Henneberg, & Naudé, 2012; Johanson & Mattsson, 1992). The position of an actor may be perceived differently by the various actors in the network, and it is dynamic in nature as actors seek to improve their positions (Abrahamsen et al., 2012; Gadde, Huemer, & Håkansson, 2003). The network position affects an actor's potential to access resources and influence other actors (Corsaro, Ramos, Henneberg, & Naudé, 2012; Johanson & Mattsson, 1992). In the solution context, one supplier typically acts as an "integrating actor" who is responsible for managing the project, engaging with the customer, and coordinating the group of internal and external contractors (Davies, 2004; Davies et al., 2007; Windahl & Lakemond, 2006). The integrator selects and coordinates the network of suppliers, integrating their resources into a new entity that becomes a new resource (cf. Davies, 2004). The suppliers to the integrating actor mainly provide the resources requested by the integrator and have less potential to affect the resource integration of other actors.

Resources are controlled by actors, but they need to be integrated to become valuable (Håkansson et al., 2009; Lusch & Vargo, 2006). Resources can be categorized into four types: first, the knowledge, experience and skills of individuals and groups, and second, organizational relationships, i.e. active, typically intangible and human "operant" resources. The other two types of resource are "operand" in nature, namely products and production facilities that are passive, often tangible resources (Håkansson & Waluszewski, 2002, p. 17; Vargo & Lusch, 2011). As interaction between companies develops, their resources become mutually adapted, i.e. resource ties emerge. At the network

level, resources can be integrated with a larger set of resources available through a web of actors, resulting in a resource constellation (Håkansson & Snehota, 1995) that may represent a more compelling value proposition for a particular situation (Lusch et al., 2010). In the solution context, the majority of research has addressed the integration of products and production facilities (operand resources) with intangible, human resources (operant resources) required in service delivery (e.g., Cova & Salle, 2008; Kapletia & Probert, 2010; Matthyssens & Vandembemt, 2008; Oliva & Kallenberg, 2003; Sawhney, 2006; Windahl & Lakemond, 2006, 2010). Very few studies discuss the development of pure service solutions, i.e. the integration of a range of operant resources (cf. Nordin & Kowalkowski, 2010).

Activity occurs when actors combine, develop or create resources using other resources (Håkansson & Johanson, 1992). As relationships between companies develop, their different activities may link, and in a networks context, activity patterns emerge. Activity links may be more or less systematic or tight, they reflect the need for coordination and will affect how the various activities are executed (Håkansson & Snehota, 1995, pp. 28). In the solution context, an integrating actor typically needs to develop stronger operational linkages with the customer, and also with the other suppliers (Nordin et al., 2011). The activity links may be simple, for example the coordination of predetermined solution components, or complex as in the co-development of a new technology or joint implementation of the solution (cf. Davies, 2004).

In sum, we conceptualize value co-creation as an iterative, collaborative process (Grönroos & Helle, 2010) that occurs at three interrelated levels: First, the individual actors execute activities to contribute and receive resources whereby they perceive benefits and sacrifices, i.e. they have their respective value creation contexts and processes (cf. Grönroos & Ravald, 2011). Second, value co-creation occurs at the relationship level through interaction and collaboration between actors (Vargo & Lusch, 2008). Third, at the network level, resources are integrated into a larger resource constellation through a pattern of activities by a web of actors (Gummesson & Mele, 2010; Håkansson et al., 2009, p. 67). This constellation of resources, i.e. the integrated solution, and the activities through which it is created, represent a new value proposition for the customer, compared to the resources available from individual suppliers. Value co-creation hence involves value processes within organizations, in relationships between actors, and within a network of actors (Fig. 1).

3. Methodology

3.1. Research strategy

This study aimed to gain a deeper insight into the phenomenon of value co-creation within solution networks, where previous empirical research is sparse, motivating a qualitative, explorative approach (cf. Yin, 2003). We chose the qualitative case study research strategy in order to create theoretical propositions inductively from case based empirical evidence (Eisenhardt & Graebner, 2007). Case studies are the dominant methodology used by qualitative researchers in industrial marketing (Halinen & Törnroos, 2005; Piekkari, Plakoyiannaki, & Welch, 2010). It is considered a particularly useful approach through which to increase understanding of topics that are previously under-investigated (Gummesson, 2000), and in situations where there are complex and multiple variables and processes (Yin, 2003). Case studies are the preferred strategy when "how" and "why" questions are being posed, the investigator has little control over events, and the focus lies on a contemporary phenomenon within a real life context (Yin, 2003).

3.2. Research design, case selection and case descriptions

We employed a multiple case design and selected two cases through theoretical sampling (cf. Eisenhardt & Graebner, 2007; Silverman, 2006). The cases are *solution networks* comprising several companies

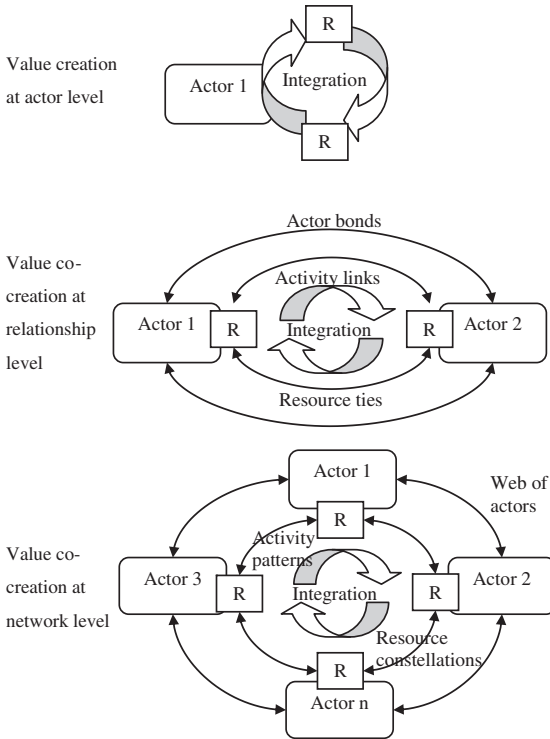


Fig. 1. Value co-creation at actor, relationship and network levels ('R' denotes resources).

that co-create value through integrated solutions. To increase the likelihood of obtaining some variability in the results and to expand the external generalizability of the findings (cf. Eisenhardt, 1989; Yin, 2003), the selected solution networks represent different industries, comprise companies of different sizes, and differ in terms of the length of co-operation. The solution networks also differed in the type of solution (i.e. product based solution and 'pure' service solution) developed and delivered, which enabled the comparison between networks to gain insight in particular into the special characteristics of service networks.

Two of the case supplier companies (Supplier A1 and Supplier B1) participated in a large service research project, which facilitated our access to the actors in these networks. It was important to the purpose of our study to build the research design to collect data from all the actors involved in a solution network. A common challenge in employing the case method in network studies is that of setting the boundaries of the study, as the network setting extends without limits through linked relationships, making any network boundary arbitrary (Halinen & Törnroos, 2005). To master complexity and avoid a massive volume of data, we defined the boundaries of the studied networks in co-operation with the two supplier firms by choosing the central partners related to certain solutions they develop and deliver together. The suppliers also pinpointed customers that differed in company size, field of business and depth of co-operation, and could thereby bring different perspectives to the studied solutions. The studied solution networks comprise a total of 14 companies. The studied companies operate in the EU and the time boundary was 11/2009–03/2012.

In Case A (pseudonym "Industrial Solution Network"), the integrated solution comprises product and service components. The integrating actor has a long tradition of operating in the focus market as

a machine retailer, and their aim is to develop their service business and differentiate themselves from competitors by infusing services into products. The supplier firms integrate machine tools (Supplier A1), robots (Supplier A2), maintenance software (Supplier A3), and after sales services (Supplier A1) as a seamless solution to meet the needs of manufacturing industry customers (Fig. 2). Supplier A1 is mainly in charge of the customer relationships as well as services including installation, implementation, training, repair and maintenance, and spare parts. Occasionally, Supplier A2 takes part in the service delivery when their robots are involved (illustrated by the dotted line in Fig. 2). The integrated solution developed within the Industrial Solution Network has only recently been launched, so we studied two potential customers that were involved in solutions development.

In Case B (pseudonym "Marketing Solution Network"), the solution network comprises six knowledge intensive business service (KIBS) companies (Suppliers B1–B6) and three customers (Customer B1–B3). The suppliers integrate a range of marketing communication and consultancy services into an entity sold as a "one-door principle" for customers in a variety of fields. The six companies bring in various resources in marketing (Supplier B1), advertising (Supplier B2), media planning (Supplier B3), customer relationship management (CRM) (Supplier B4), business consultancy (Supplier B5) and production services (Supplier B6). The actors share many long-term customer relationships, three of which were selected for our study (Customers B1–B3). Fig. 3 illustrates the companies involved in the Marketing Solution Network case.

The supplier companies are part of a group, i.e. they are at least in part owned by the same parent company. However, they operate as independent firms, sometimes even competing with each other. Network composition is not in any sense static within the group; the companies co-operate in multiple networks with other firms as well. The solution delivery concept is that the account manager in question is in

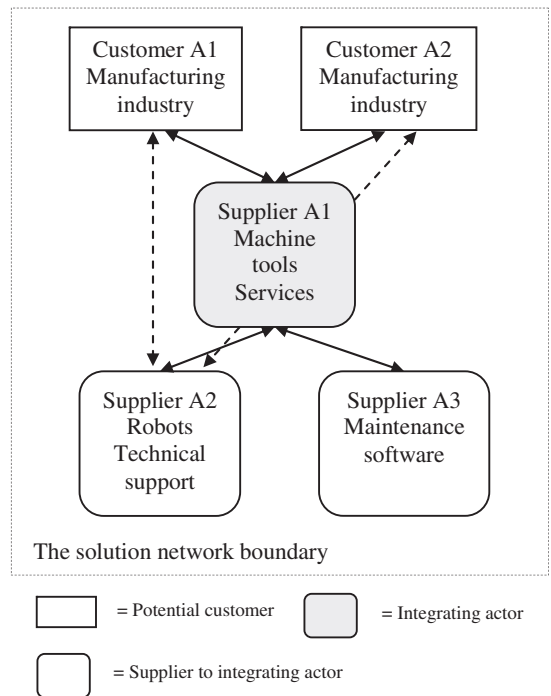


Fig. 2. Illustration of the Industrial Solution Network.

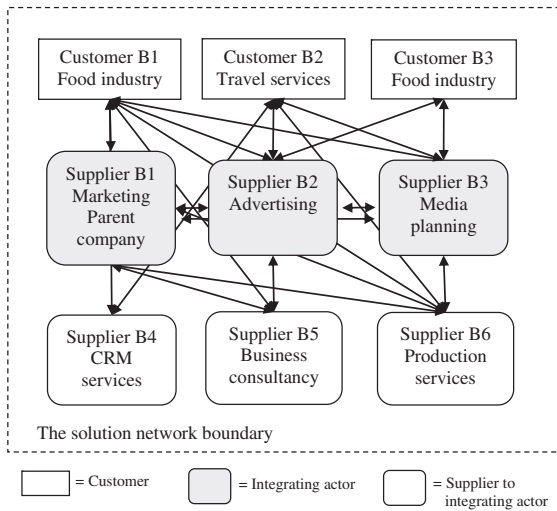


Fig. 3. Illustration of the Marketing Solution Network.

charge of integrating the required resources from the six supplier firms. Usually, Supplier B2 or Supplier B3 operates as the integrating actor while the others supply them. Supplier B1 also operates as an integrating actor while managing development work conducted at group level. All the suppliers operate at the customer interface in service delivery, although the intensity and level of interaction with the customer organization varies considerably.

3.3. Data collection and analysis

As is typical of theory building research (Eisenhardt, 1989), we combined multiple data collection methods. The primary method for this study was in-depth interviewing (Fontana & Frey, 1994), and additional data were collected by observing and participating in company workshops and sales negotiations. The rationale behind employing several data collection methods and collecting data from several different sources was to enable triangulation, which produces more accurate findings and a deeper understanding of the studied phenomenon and improves the validity of the results (Eisenhardt,

1989; Piekkari et al., 2010; Van Bruggen, Lilien, & Kacker, 2002; Yin, 2003). The data sources for this study comprised 14 firms: nine suppliers and five customers; the empirical data comprised a total of 39 in-depth interviews (Table 1) and the observation of 13 company workshops or meetings (Table 2).

We chose a spread of informants that ensured different perspectives on the solution networks studied (cf. Piekkari et al., 2010). We selected interviewees in each company and where possible from different business units and organizational levels. The interviewees were extensively involved in the development and delivery of the solutions in their respective firms, and occupied a central position regarding relationships with other actors in the business network. We disguised the names of the participating firms to maintain anonymity as requested by the informants.

The interviews followed a loose thematic guide. We allowed the informants a great deal of freedom to express their views and raise new issues (Yin, 2003), in order to exploit the naturally occurring data (cf. Silverman, 2006). We asked the interviewees from the supplier firms to discuss their motivations, perceptions related to the organization and the solutions process, and experienced benefits and sacrifices related to the integrated solutions and network co-operation. We interviewed customers to discover their reasons for buying integrated solutions, experiences of co-operation with the suppliers, and expected and experienced benefits and sacrifices related to the solution. The interviews lasted between 31 and 89 min and they were recorded and transcribed in verbatim.

Additional data were collected by observing company workshops (Table 2), where the supplier companies discussed confidential issues related to their common customers, the development and delivery of integrated solutions, as well as ideas to improve the solution and co-operation between network actors. We were also able to observe a number of sales meetings between Supplier A1 and their potential customers. The company workshops provided additional data regarding the issues studied, and especially enabled the verification and triangulation of the data thus improving the study's trustworthiness (cf. Yin, 2003). We documented the company workshops and meetings by taking notes.

Data analysis was conducted in line with the process of inductive theory using case studies, proposed by Eisenhardt (1989). The theoretical framework (Fig. 1) guiding the data analysis was devised drawing on a broad range of literature, which is especially important in theory building research where findings are often based on a limited number of cases (Eisenhardt, 1989). We began our data analysis by reviewing the interview transcripts and documents to highlight significant issues and identify patterns in the data (Miles & Huberman, 1994). In the

Table 1 Overview of the in-depth interviews.

Company (field)	No. of interviews	Position of informants
Supplier A1 (solutions integrator, machine retailer, industrial services)	n = 9	CEO, director of business unit, repair and maintenance engineer, repair and maintenance personnel, sales manager, sales personnel
Supplier A2 (automation manufacturing, industrial services)	n = 3	CEO, marketing manager, product manager, R&D manager
Supplier A3 (IT)	n = 1	ICT-manager
Customer A1 (manufacturing industry)	n = 2	Production engineer, a supervisor
Supplier B1 (marketing)	n = 2	Group CEO, group's development manager
Supplier B2 (advertising)	n = 6	Digital strategy director, key account manager, project planner, two copywriters, art director
Supplier B3 (media planning)	n = 4	Senior client director, two client directors, planning director
Supplier B4 (CRM)	n = 2	CEO, art director
Supplier B5 (business consultancy)	n = 1	CEO
Supplier B6 (production)	n = 1	CEO
Customer B1 (food industry)	n = 6	Marketing director, marketing manager, brand manager, two product group managers, product manager
Customer B2 (travel services)	n = 1	Company director
Customer B3 (food industry)	n = 1	Regional director
	n = 39	

Table 2
Overview of data collected through observation.

Event, participants	Focus of the event
Meeting: Supplier A1 and Customer A1 (n=3)	Business negotiation concerning customer needs and Supplier A1's service offering
Workshop: Supplier A1 and Supplier A2 (n=6)	Service business aims, product and service offerings, technical specifications of the robot
Meeting: Supplier A1 and Customer A1 (n=5)	Business negotiation of a possible new contract
Workshop: Supplier A1 and Supplier A2 (n=2)	Benefits of integrated solution, sharing of customer information and analyzing markets, task division
Workshop: Supplier A1 and Supplier A2 (n=4)	Benefits of integrated solution, sales arguments, common launch and marketing plans
Internal workshop: Supplier A1 (n=4)	Company strategy day, market analysis
Workshop: Supplier A1 and Supplier A2 (n=3)	Prerequisites for collaboration, aims and collaboration model
Internal workshop: Supplier A1 (n=7)	Motives for developing service business, benefits of the solution and sales arguments
Internal workshop: Supplier A1 (n=6)	Motives for developing service business, development needs for repair and maintenance organization
Internal workshop: Supplier A1 (n=2)	Analyzing the customer's value creation process
Internal workshop: Supplier A1 (n=2)	Analyzing the customer's value creation process
Meeting: Suppliers B1, B2 and B3 (n=5)	Discussion about the aims of a joint development project
Workshop: Suppliers B1–B6 (n=8)	Functioning of the co-operation and development needs
Workshop, Suppliers B1, B2 and B3 (n=4)	Value of the integrated solution
Workshop: Suppliers B1, B2 and B3 (n=5)	Defining and describing the content of the solution
Workshop: Suppliers B1, B2 and B3 (n=3)	Analyzing the customer's value creation process

first phase, we categorized the data in terms of extracts related to actors, resources, and activities that describe the studied solution networks and according to our tentative framework (Fig. 1) are the building blocks of value co-creation. In the second phase, we sought comments concerning the expected or experienced benefits and sacrifices of each actor. Next, we contrasted and compared 1) the identified benefits and sacrifices across actors in each case and between cases, and 2) the identified benefits and sacrifices in relation to actor bonds, resource ties and activity links. We also compared the suppliers' and customers' views on value and the solution process by placing quotes in the same table and by identifying conflicting views and seeking explanations for them. By comparing the studied cases, we were able to draw conclusions regarding how the types of resources integrated affect value co-creation. These iterative processes teamed with continuous reflection against the theoretical framework enabled the emergence of tentative themes, such as potential reasons for actors' implicitly expressed value perceptions, and their interrelation with the broader network (cf. Eisenhardt, 1989). We strengthened research validity through replication logic (Yin, 2003), and compared the cases against our study's conceptual framework (Fig. 1). Consistent analysis frameworks (ARA model and value elements) helped us verify that the emergent relationships between constructs fit the evidence in both cases (cf. Eisenhardt, 1989).

3.4. Reporting

Following common practice within industrial marketing research (Piekkari et al., 2010), we report the findings thematically and link them back to the conceptual framework (Fig. 1) and the research question (cf. Eisenhardt, 1989). In this study, the ARA model functions as a framework to study how interaction links resources over multiple organizational boundaries in a larger network (Häkansson et al., 2009, p. 67), which is the underlying mechanism in value co-creation within networks (Gummesson & Mele, 2010). First, we employ the ARA framework to describe how the actors in the two studied solution networks integrate resources in interaction. Second, we report the benefits and sacrifices that each network actor perceives in resource interaction. Final sections of the paper reflect the findings against previous research and discuss their contribution.

4. Findings

4.1. Resource integration in the studied solution networks

4.1.1. The Industrial Solution Network

The actors in the Industrial Solution Network were the three supplier firms and two of their potential customers. Supplier A1 is the integrating actor, responsible for delivery of the integrated solution to

the customer, and Supplier A2 and Supplier A3 supply the integrating actor. The actors had congruent perceptions of the network positions of the actors in the network, and they easily agreed upon their positions from the moment co-operation commenced. Supplier A1 developed relationships with customers, while other actors had limited access (Supplier A2) or no access whatsoever (Supplier A3) to the customer interface. The relationships between the suppliers were open and trusting.

Resources integrated in the Industrial Solution were machine tools, robots, maintenance software and industrial services, i.e. a combination of operand and intangible operant resources. The suppliers' resources were complementary: Supplier A1 had the customer insight regarding the focus market, and the other suppliers mainly offered technology components for the solution. As the solution comprised more or less standardized components, the resource constellation could be easily predefined and all the suppliers had a precise perception of the solution content. The customers provided feedback on the developed solution and the features they value, and thus contributed R&D resources for the suppliers. Customer provided information was also required to customize the solution to fit their manufacturing process. Largely, this meant choosing from pre-determined technology options presented to the customer. Also, the delivery of the industrial services demanded customer resources in the form of knowledge of the manufacturing technology and processes to enable the suppliers to conduct repair and maintenance activities at the customer's premises.

The activities between the network actors were clearly defined and the suppliers were able to map the solution process beforehand. The suppliers integrated the solution components largely by integrating the technology interfaces. Supplier A1 integrates services into product life-cycle phases to repair and maintain the machines. The relationships between the suppliers are more or less transaction based as Supplier A2 delivers the predefined robots, and Supplier A3 the manufacturing software on which Supplier A1 pays the licence. However, activity links between Supplier A1 and the Supplier A3 were intensifying as they continued developing the software to meet the needs of the integrated solution ever more effectively. The fact that Supplier A1 operates primarily at the customer interface made it easier to coordinate the supplier group and the processes between the customer and the suppliers.

4.1.2. The Marketing Solution Network

The actors in the Marketing Solution Network were KIBS organizations that each specialize in a specific area of marketing communication and consultancy, and three of their customers. The professionals were organized into teams to serve each individual customer organization. The team members typically represent different firms and bring in the required expertise for each specific solution. Usually, one of the largest firms, B2 or B3, functions as an integrating actor, and assigns

an account manager to lead the group of suppliers. However, it was apparent that there were different interpretations of the actors' network positions. The teams generally work together for a longer period of time and personal bonds develop between individuals. Many interviewees emphasized the importance of personal chemistry and trust between individuals. The degree to which team members perceived closeness, trust and rapport varied in different teams. Some interviewees felt that their competence was not appreciated, and perceived inter-firm tension and rivalry. In this case, the majority of the firms operated at the customer interface: for example, brand managers in the customer organization co-operated with art designers. So personal bonds developed between actors at all levels of the supplier and customer organizations.

Resources comprising the supplier network's value proposition were a flexible constellation of top expertise in each area of marketing communication and consultancy. Originally, this vision was developed by the parent company (Supplier B1) that was in charge of developing the group's business as a whole. The resources contributed by each supplier firm to solution development were knowledge intensive and intangible, i.e. operant in nature: specialist skills, artistic talent, expertise and knowledge. Knowledge of and access to the customer was a resource contributed by the larger firms in particular. The quality of customer resources was especially important in this case; the customers provided information about their preferences, problems, and business goals, and knowledge and materials on their brands and products played a pivotal role throughout the solution process. The actors had differing opinions about the importance of particular resources: each actor tended to view resources in their area of specialization as key to the developed solution. Some of the smaller firms felt that the resources they could contribute to the joint solution were not considered equally important to the leading firms' resources. As the content of the optimal solution was impossible to determine in an objective manner, the resource constellation was to some degree determined by the actors' positions in the network.

A complex pattern of *activities* was required in the solution development, as information and other resources needed to flow smoothly between the customer and the different supplier firms. The suppliers shared some technical and administrative links through their part joint ownership which facilitated information sharing. The intangible, operant resources were integrated through joint ideation, interaction and mutual adaptation. The coordination of the activities was perceived as rather complex: as the solutions were highly customized, the processes needed to remain flexible and planning standardized activity patterns was challenging. In addition, the actors representing

different functions and their respective counterparts at the customer organization needed to be in frequent contact. According to the interviewees, customer preferences for the intensity of the joint activities varied: some expected to be involved extensively, while others preferred joint activities to be kept to a minimum. Table 3 outlines the characteristics of the studied solution networks.

4.2. Benefits related to integrated solutions

In the studied cases, the primary motive for actors to be involved in solution networks was the need to gain access to complementary resources. In the words of Supplier A1: "If we use an outsider, we look for professional skills – the kind of competence that we don't have ourselves. That's always the number one reason for co-operation." Suppliers in both cases pointed out that customer needs are so diverse and demand such a variety of resources that none of the companies could deliver the solution alone. The *integrating actors*, who take primary responsibility in solution integration, perceived benefits in the potential to serve large, attractive customers with a broader value proposition based on the resources available in the solution network. In the Industrial Solution case, interviewees representing the integrating actor (Supplier A1) remarked that by integrating external resources into their products, they can differentiate the company from competitors, increase product sales and manage seasonal changes. Some of the interviewees in the Marketing Solution Network pointed out that a solution network also brings flexibility to resource allocation as tasks can be divided in several ways between the suppliers. The integrating actors benefitted from their network position, as closeness to the customer and the potential to determine the optimal resource constellation for the solution were believed to lead to more profitable business. A client director of Supplier B3 remarked: "I think that both of us [Supplier B2 and Supplier B3] have exactly the same goal of wanting to be a strategic partner to our customer. That way we can commit our customer to long-term co-operation ... get those projects that are very profitable."

In both solution networks, the fact that the integrating actor took responsibility for sales and customer relations accrued benefits in terms of cost and time savings for the *suppliers to the integrating actor*. They also perceived that co-operation with bigger, well-known companies in the industry was important for their image and made them more attractive to customers: "We're a small company, the network gives us credibility" (Supplier B4). Another benefit was the potential of generating new business. Supplier A2 could increase sales of their robots by subcontracting them to Supplier A1. Suppliers A2 and A3 gained also access to new customer relationships through the solution network: they

Table 3
The characteristics of the studied solution networks.

	Industrial Solution Network	Marketing Solution Network
Actors	<ul style="list-style-type: none"> The central supplier and customer firms involved in the development and delivery of the integrated solution Clearly defined and stable network positions Strong personal bonds among only some actors 	<ul style="list-style-type: none"> The central supplier and customer firms concerning the development and delivery of the integrated solution Dynamic network positions and effort to improve one's position Strong personal bonds between actors in all supplier and customer organizations High importance of personal relationships and 'chemistry' between people
Resources	<ul style="list-style-type: none"> Operand resources (products) augmented with operant resources (services) Solution comprising rather standardized components A clear and predefined resource constellation Customer resources utilized especially in selecting technology options to fit the solution to the customer's manufacturing process 	<ul style="list-style-type: none"> Operand resources: knowledge, expertise, skills, information Highly customized solution Differing resource constellations because of the creative process and varying customer needs Customer resources pivotal in every phase of the solutions process
Activities	<ul style="list-style-type: none"> More or less transaction based relationships Systematic activities and mapped processes Straightforward integration because of clear division of solution components One company responsible for coordination and the customer interface 	<ul style="list-style-type: none"> Administrative and technical links due to part joint ownership Complex pattern of activities in solution development Flexible processes Resource integration through rich ideation, problem solving, interaction and mutual adaptation Demanding coordination, as all actors are involved in activities with the customer

could enter manufacturing industry markets, which was new for them. They also benefitted from manufacturing industry customer insight, which could be integrated into their own R&D processes. Supplier A3 saw the opportunity to sell the developed maintenance software beyond the initial solution network: "Our basic idea is that the developed software is as generic as possible so that we can sell it to other [manufacturing] customers as well." (Supplier A3). In addition to new customers, the suppliers for the integrating actor could also serve their present customers more effectively with the extended service offering, as the following quote illustrates: "Always in a project, which is conducted in such close co-operation as this project, you learn several things from your customer. Now we have a more precise view of what maintenance is in practice." (Supplier A3).

When asked about the value accrued through integrated solutions, the *customers* in both cases explained that the ease of buying the solutions is a major benefit to them: "I don't suppose we benefit financially [from buying a larger entity], but if we would always negotiate with several suppliers, compare them and possibly change suppliers, we would probably get a deal at a lower price, but it certainly wouldn't be easier for us that way." (Customer B2). In the Marketing Solution Network, the interviewees mentioned also the benefit accrued through a more extensive resource constellation and well-coordinated activities: when a group of suppliers were capable of providing a full service solution, the marketing message that was broadcast through a variety of media and e.g. product packaging was realized in a coherent, synergistic way. In the Industrial Solution Network case, Customer A1 pointed out that, as service suppliers possess expert knowledge about the machines, they were capable of suggesting improvements from which benefits might accrue in terms of manufacturing process efficiency and investment planning. In other words, the solution in both networks was considered to deliver more than the sum of its parts.

In both cases, customers declared that having the supplier handle the integration tasks was a real benefit. They said it saves them time and effort if they do not have to coordinate the whole palette of service providers: "It does make our life easier as we don't have to inform every party so much, as they know themselves what they do and what they deliver to us." (Customer B1). However, in the Marketing Solution Network, customers also mentioned that they occasionally preferred to purchase service modules from several suppliers and take responsibility for the coordination themselves, as they want to use the best creative talents and the "right" type of people.

4.3. Sacrifices related to integrated solutions

The *integrating actors* (Suppliers A1, B1, B2 and B3) in our cases perceived several sacrifices involved in solution development, mainly in terms of time and money invested, alongside risks and challenges. Sales and marketing activities, customer relationship management and coordination work demanded time, effort and money. In a development workshop, one CEO asked: "How can we get the customer to pay for the integration and network coordination tasks? How can we make the benefits visible that our coordination work saves the customer's time and effort?" (Supplier B1). A major sacrifice for Supplier A1 was the required investment in training sales and maintenance personnel as a consequence of the new solution. Especially the integrating actors noted the risk of sharing a common customer interface with other actors, which meant that their own reputation would be partly dependent on the performance of other suppliers. This risk was more prominent in the Marketing Solution Network, where all the suppliers were in contact with the customer, whereas in the Industrial Solution Network, mainly Supplier A1 was responsible for customer interaction.

Another sacrifice noted was the risk of becoming too dependable and tightly linked with the other actors in the solution network: some suppliers felt that intense resource ties and activity links were a restraint in developing their business in the direction they wished. Some actors pointed out that they wanted to remain open to co-

operation with actors outside this solution network. One manager emphasized: "We perform equally well with any company or possible partner, not only with these companies involved [in the Marketing Solution Network]" (Supplier B3).

The *suppliers for the integrating actors* perceived their limited potential to affect timetables or decisions regarding the solution as a sacrifice. In the Industrial Solution Network, the integrating actor was responsible for selling the solution, and its suppliers had limited potential to affect sales targets and activities despite having invested substantially in the common solutions development project. The views of actors in the network differed remarkably with regard to the solution sales targets: "Their first suggestion [on sales targets] was notably smaller than our perception, but the latest view is getting clearly closer to ours." (Supplier A2). If Supplier A1 did not reach a sufficient sales volume, it would become impossible for Supplier A2 to achieve a profitable outcome, resulting in wasted R&D. In the Marketing Solution Network, many actors considered the position of a sub-contractor was less desirable, and predominantly hoped for more intensive role: "Sometimes it seems that at Supplier x they don't trust us and don't listen to us, or include us in their processes. It's really unfortunate if they can't see the development work that we could do together..." (Supplier B2). However, not all of the actors were dissatisfied with their network position, as one CEO stated: "We should not consider the leader position as a 'better' position than any other position. We can do profitable business as a partner or a sub-contractor and we have no desire even to pursue anything else. This is what we do best." (Supplier B4). In the Industrial Solution case, suppliers for the integrating actor perceived also the loss of contact with the end customer as a sacrifice they got less customer information that was needed for R&D. Suppliers also needed to make a large upfront investment which would generate income much later.

Customers in both cases mentioned that lack of transparency in pricing is a sacrifice related to integrated solutions. Some customers were suspicious and felt that the integration work comes at too high a price. In the Marketing Solution Network case, it became explicit that the customers wanted to use the full potential of the resources in the solution network, but were worried about the cost of doing so. They felt that if only the integrating actor was involved, their resources rather than customer needs would define the solution content. A customer remarked: "How many suppliers should we involve – the whole group or a part of it? If we choose only one supplier at the beginning, it limits the perspective. If we involve them all, it's going to cost us." (Customer B1). In some cases, the customer wanted to control the suppliers and even choose the project team members. They considered the lack of control over service suppliers a risk related to integrated solutions.

Tables 4 and 5 provide an overview of our key findings in relation to the benefits and sacrifices constituting the value of the integrated solutions. In the Industrial Solution Network case, the findings relate to experienced value by the suppliers and *expected* value by the customer, as the solution is newly developed and there are as yet no long-term perceptions. The findings related to the Marketing Solution Network concern long-term experiences of suppliers and three of their mutual customers.

5. Discussion, conclusions and limitations

5.1. Main contributions

The purpose of this paper was to study how value is co-created in solution networks. Despite previous indications regarding the importance of relationships and collaboration between multiple suppliers to solution outcomes (Cantù et al., 2012; Davies, 2004; Tuli et al., 2007; Windahl & Lakemond, 2006), previous studies provide scant insight on how actors integrate resources in interaction to develop integrated solutions, or what value they perceive in solutions. Compared to earlier research on solutions, this study offered a holistic perspective by applying an interaction based ARA-framework to the study of all

Table 4
Actor-level value perceptions in the Industrial Solution Network.

Actor, network position	Experienced benefits	Experienced sacrifices
Supplier A1, integrating actor	<ul style="list-style-type: none"> • Support for strategy i.e. growth of service business through complementary resources • Differentiation from competitors • Managing seasonal risk through life-cycle services and long-term customer relationships 	<ul style="list-style-type: none"> • Sales and marketing activities • Investing in training sales and maintenance personnel • Effort in integrating technology and services • Risk of the partner operating at the customer interface under their brand
Supplier A2, supplier to integrating actor	<ul style="list-style-type: none"> • Increase in robot sales • Gaining access to a new market • Input to R&D from another customer segment 	<ul style="list-style-type: none"> • Risk of wasted R&D through the limited potential to affect sales aims and activities • Risk of not getting enough input to own R&D via partners' personnel
Supplier A3, supplier to integrating actor	<ul style="list-style-type: none"> • Gaining access to a new market • Input to R&D from another customer segment • Learning about a new customer segment • Extending own service offering 	<ul style="list-style-type: none"> • Large upfront investment in R&D but profits generated much later
Customer A1 and A2	<ul style="list-style-type: none"> • Easy to buy with one-door principle • Less coordination work • Efficiency of manufacturing process and support in investment planning • Concentration on core business 	<ul style="list-style-type: none"> • Integrated solution is a significant investment for an SME • Lack of transparency in pricing

actors involved in specific solution networks. Our study described how value co-creation occurs in the interplay of actors, resources and activities in solution networks, and demonstrated that the value processes a) within individual customer or supplier organizations, b) between the co-operating suppliers, and c) between the customers and their solution suppliers are iterative and inherently interlinked. This study was among the first empirical studies to combine the perspectives of value co-creation and the interaction and network approach. Thereby it contributes also to the value literature with new conceptual understanding and empirical insights into value co-creation within networks (Lusch et al., 2010; Vargo & Lusch, 2011), which has to date been discussed predominantly at a theoretical level.

Existing research on solutions offers little insight into how integration affects *customer perceived value* (cf. Evanschitzky et al., 2011). We found that for the customer, the value of a solution is accrued either from *more efficient activity patterns*, i.e. the customer can outsource resource integration to the supplier which either increases benefits (better results, seamless experience) or diminishes sacrifices (less effort); or from *better resource constellations*, i.e. the customer acquires a solution where new resources have been created by extensive integration to meet specific needs. Our study also indicates that not all customers

perceive benefits in integrated solutions: a customer might not want to lose control over its choice of suppliers, and might be sceptical about the cost-benefit of outsourcing the integration work. These empirical findings contribute to extant literature on solutions where customer perceived value has discussed on a rather general level (e.g. Miller et al., 2002; Sawhney, 2006).

Our study indicates that customer perceived value was affected by resource integration and interaction processes between suppliers: in the studied cases, relationship bonds and activity links between suppliers were reflected on the customer experience of the solution process and the extent of the resource constellation. For example, when there was distrust or a lack of information exchange between suppliers, the integrating actor may not have known of, or made full use of, the resources that its suppliers could have offered. While previous research has primarily paid attention to the operational effectiveness of solution networks (Miller et al., 2002; Stremersch et al., 2001; Tuli et al., 2007), these findings emphasize the importance of actor bonds.

Previous research on *value perceived by solution suppliers* predominantly focus on the benefits of servitization (cf. Nordin & Kowalkowski, 2010), and does not address the value processes between multiple actors involved in solution development. Our study indicates that the

Table 5
Actor-level value perceptions in the Marketing Solution Network.

Actor, network position	Experienced benefits	Experienced sacrifices
Supplier B1, parent company	<ul style="list-style-type: none"> • Enhancing the group's business by developing a full service offering involving multiple actors 	<ul style="list-style-type: none"> • Sales and customer relationship management activities • Coordinating the common development work
Supplier B2 and B3, integrating actors	<ul style="list-style-type: none"> • Profitable business through being 'close to the customer' • Access to partners' complementary resources • Flexibility of resource allocation 	<ul style="list-style-type: none"> • Overlapping goals between the suppliers • Coordination work • Own reputation is affected by partners' performance at the customer interface • Dependence on partners' resources impacts own agility and service development • Commitment to a specific network may limit partnering with others
Suppliers B4–B6, suppliers to integrating actors	<ul style="list-style-type: none"> • Credibility from being a part of a known network • Less or no sales activities • Access to bigger customers that can be used as references 	<ul style="list-style-type: none"> • Lack of trust in each other's competences • Limited potential to affect timetables or content of the solution • Professionals' reluctance to act as mere resource providers
Customers B1–B3	<ul style="list-style-type: none"> • Ease of buying • Less coordination work • Better results through seamlessly integrated marketing communications • Concentration on core business 	<ul style="list-style-type: none"> • Incoherent service experience from the service suppliers • Supplier's own interests and resources may define the solution instead of customer needs • Lack of control over service suppliers • Cost structure of the solution, lack of transparency in pricing

network position (Gadde et al., 2003; Johanson & Mattsson, 1992) of an actor has a significant impact on the kind of benefits and sacrifices the actor perceives. The integrating actors perceived value in their access to partners' complementary resources, which created the potential to offer a customer more extensive value propositions, and thus deepen their ties and linkages with the customer, which in turn accrued them more resource contributions from the customers. On the other hand, they experienced sacrifices regarding the effort and risk related to selling and marketing the solutions, coordinating the supplier network, and developing resource ties and activity links. Those actors who operated as suppliers to the integrator perceived benefits in access to new resources, particularly the customer relationships, and customer insight that could be used in their own business development. The sacrifices experienced particularly by suppliers of tangible resources related to losing intimate customer contact and the limited potential to affect the solution content as well as sales targets and activities. Again, the value accrued to the individual supplier was dependent on their relationship with the other suppliers: distrust, a lack of appreciation and insufficient activity links affected the resources they contributed and received, and the nature of activities performed, which in turn was reflected on the network-level value proposition and eventually the value experienced by the customer. These findings contribute to extant knowledge on supplier perceptions on solution business.

Majority of the solution research focuses on infusing services into products (e.g., Matthyssens & Vandembemt, 2008; Skarp & Gadde, 2008), and few, if any studies address the integration of pure service components (Nordin & Kowalkowski, 2010). An important finding of this study was that the *type of resources* integrated in the solutions seems to influence value co-creation. The study of two different kinds of solution revealed that the integration of operant, i.e. intangible, human resources induces more sacrifices, but also new value potential for actors. When the integrated resources are mainly operant, it may be more difficult to demonstrate the resource constellation in advance and thus convince the customer of its value. The customer may experience an increased risk, as the outcomes of the solution are difficult to evaluate and predict. This may weaken the appeal of outsourcing the integration work.

Our study indicates that when the solution involves mostly operant resources which cannot be disentangled from the actor, more suppliers are bound to have direct activity links with the customer. This makes the nature of supplier bonds and activity links between suppliers to some extent visible to the customer. Furthermore, when the resources are highly operant, the processes of integration are difficult to plan for or standardize. Managing a "seamless" solution delivery (Brady et al., 2005; Brax & Jonsson, 2009) is more challenging when the solution comprises service elements, as customer contact often cannot be devoted to just one actor. Our findings indicate that where pure service solutions are concerned, the highly customized nature of the solutions and varying resource constellation comprising mainly operant, i.e. intangible human resources make it more difficult for the integrating actors to control and plan resource integration, resulting in increased sacrifices. As the resource constellation of the studied service solution was not standardized, actors perceived opportunities to seek for an improved network position, which caused tension in the network. On the other hand, the dynamic nature of resource integration opened up more potential for collaboration in the problem solving and ideation work, which may lead to innovating entirely new solutions. These insights concerning the pure service solutions contribute to the existing knowledge on solutions that largely rests on studying product-service bundles (e.g. Brax & Jonsson, 2009; Windahl & Lakemond, 2010).

5.2. Limitations and research implications

We studied an extensive, complex phenomenon, from the rather narrow empirical perspective of two particular solution networks. Case study research strategy sets limitations on the degree to which

the findings can be generalized beyond the studied context: while statistical generalization is not possible nor the purpose, it is possible to reach an interpretation of the studied phenomenon that could be transferable to other cases of a similar type (i.e. analytic generalization), in other words, the results are likely to apply to solution networks of similar character (Hirschman, 1986; Yin, 2003). By selecting solution networks that varied in the nature of actors, activities and resources, we sought variation that could reveal a broader view of the studied phenomenon and expand the generalizability of the findings (cf. Eisenhardt, 1989; Yin, 2003). An in-depth insight into two solution networks provides an understanding of the studied phenomenon as a whole and reveals important avenues for future research.

The selection of cases can also be subject to criticism: the Industrial Solution Network consisted of three supplier companies and two potential new customers. Undoubtedly, a broader set of companies could bring more variability and possibly provide new insights that remained undiscovered in this study. Furthermore, the Industrial Solution Network represented a new, recently formed network. No long-term experiences of co-operation and the perceived benefits and sacrifices existed at the time of the study. Studying value perceptions, and the processes of resource integration over a longer period, might have improved the quality of the results.

Another limitation concerns the theoretical perspective and scope of the study. We studied value in the form of actors' perceptions of benefits and sacrifices (e.g. Eggert & Ulaga, 2002; Ravald & Grönroos, 1996) with respect to the processes and outcomes of resource integration. Our paper primarily focused on studying *how value is created, i.e. how it emerges* for each party in a network of actors integrating resources, but how the benefits resulting from co-creation are shared was out of our scope. In fact, very few attempts have been made to study the interplay between value co-creation and value appropriation (see Grönroos & Helle, 2010; Wagner, Eggert, & Lindemann, 2010). How the (monetary) outcomes of network-level value co-creation processes should be calculated and shared is therefore an important avenue of future research.

This study demonstrates the importance of studying value creation from multiple levels and perspectives. We identified potential linkages between the value processes of actors and their wider network, and postulated that the type of the resources integrated may be an antecedent to certain benefits and sacrifices. Future research should further investigate these linkages and explore also other antecedents to value co-creation in solution networks.

The study further indicates that customers may not always perceive benefits in integrated solutions. Particularly suppliers developing pure service solutions may face challenges in convincing customers of the solution value. Future studies could help companies identify the prerequisites for customer perceived value in solutions. More research is also needed on how customers differ in their co-creation preferences, and on the drivers for such preferences, as these questions would yield additional knowledge on the opportunities for developing integrated solutions (c.f. Windahl & Lakemond, 2010).

5.3. Managerial implications

This study shows that the value processes of individual actors affect value co-creation at the network level. We encourage actors to identify both their suppliers' and end customers' views of the benefits and sacrifices they perceive in the collaboration, because these value processes are more or less directly interlinked. Our study indicates that particularly in service solution networks, the dissatisfaction of a single sub-contractor may very well manifest itself to the end customer as a compromised value perception. Therefore firms should be concerned with the satisfaction of their suppliers, too. In particular, overlapping resources and competition among partners seemed to hamper value co-creation within solution networks. We recommend that companies

carefully identify their core competences and select partners that complement their own resources in a fruitful way.

Our findings indicate that actors in solution networks should make an effort to acquire a uniform understanding of the positions of different actors in the network: actors' conflicting perceptions may hamper the creation of a coherent, "seamless" service experience for the customer, which may be considered a central value proposition of integrated solutions. This study described how actors accrue value in solution networks in several ways in various network positions that each entails some benefits and sacrifices. Therefore, we suggest that companies should not consider any network position to the "best" one, but should identify the benefits and sacrifices associated with different positions in each individual network, and concentrate on improving their position accordingly, or aim to develop a profitable and risk-reducing portfolio of positions in different networks.

Solution networks can be a great asset to companies as they provide access to new markets or complementary resources, and offer the potential for the creation of new resources through interaction between all the network actors, including the customer. Our study suggests that trust and rapport among actors facilitate the integration of especially more intangible, operant resources. Companies could benefit from extensive, joint ideation and problem solving among a broad range of actors in a solution network, as that facilitates the development of new resource constellations that have a higher value potential.

Finally, the findings show that not all customers feel that integrated solutions offer sufficient benefits, and a solution's value potential may depend on customer resources. Solution suppliers should therefore develop means of identifying customers with a greater tendency to acquire broader solutions, gain an understanding of the customer's value processes, and develop resource constellations and activities accordingly. We also urge suppliers to develop methods and metrics for calculating and pricing the value of coordination and integration work, and make it visible to their customers.

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ARTICLE II

**Co-creating
customer-focused solutions
within business networks**
A service perspective

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Co-creating customer-focused solutions within business networks: a service perspective

Co-creating customer-focused solutions

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Abstract

Purpose – Increased competition and more extensive customer needs have motivated companies to develop integrated solutions. In practice, companies struggle to co-create effective solutions that meet customer needs. The purpose of this paper is to identify critical factors affecting the effective co-creation of customer-focused solutions within business networks.

Design/methodology/approach – The study investigates the co-creation of two different types of solution. Data were collected from two business networks comprising 13 companies, including suppliers and their customers. The empirical data comprise 51 interviews and observations made at 21 company workshops.

Findings – Effective co-creation of solutions requires a fit between the perceptions of multiple suppliers and their customers with regard to core content, operations and processes, customer experience and value of the solution. Co-creation is affected by, e.g. customer's preferences for participation and value, and the degree of competition, clarity of role division and rapport among the suppliers.

Research limitations/implications – Further empirical research is needed to examine how companies could overcome the problems identified, and reap the opportunities arising from the factors affecting the co-creation of solutions.

Practical implications – The paper presents a framework that outlines practical activities that help firms to reconcile the perspectives of different actors, and to facilitate the integration of resources when co-creating solutions within business networks.

Originality/value – The paper contributes to the solutions literature by studying solutions as a network-level process of resource integration between multiple suppliers and their mutual customers, and by applying a service concept framework to the study of integrated solutions.

Keywords Integrated solution, Co-creation, Service concept, Business network, Customers, Business development

Paper type Research paper

Introduction

In many industries, increased competition, declining margins and more extensive customer needs have made it essential for companies to seek differentiation and customer loyalty by offering integrated solutions rather than individual products or

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services (Shepherd and Ahmed, 2000; Foote *et al.*, 2001; Miller *et al.*, 2002; Davies, 2004; Windahl and Lakemond, 2006). Firms generally agree that they should become “solutions sellers” and have enthusiastically embraced the idea – at least in their marketing communications. However, in practice, companies often struggle to design solutions that meet customer needs or develop the skills and processes needed for the effective delivery of solutions (Evanschitzky *et al.*, 2011; Ulaga and Reinartz, 2011; Epp and Price, 2011). Previous literature indicates that results from solution business often fall short of expectations (Tuli *et al.*, 2007; Epp and Price, 2011). Therefore, this paper studies factors affecting the effective co-creation of customer-focused solutions.

Solutions are predominantly defined as bundles of products and/or services that meet customer specific needs and have higher potential for value creation than the individual parts would have alone (Brady *et al.*, 2005; Davies *et al.*, 2007; Tuli *et al.*, 2007; Nordin and Kowalkowski, 2010). Aside from a few exceptions (Tuli *et al.*, 2007), the main body of literature on solutions is concerned with the integration of products and services, particularly in manufacturing and capital goods industry (Galbraith, 2002; Oliva and Kallenberg, 2003; Sawhney, 2006; Windahl and Lakemond, 2006, 2010; Davies *et al.*, 2007; Cova and Salle, 2008; Matthyssens and Vandenbempt, 2008; Kapletia and Probert, 2010). As Brax and Jonsson (2009) observe, the basic assumption in the solutions literature is that the challenge of realising an effective solution business relates to the integration of services with the goods. However, the seminal study by Tuli *et al.* (2007) highlighted that from the customer viewpoint, solution effectiveness depends on factors that affect the relational processes of solution creation, and ultimately the extent to which the solution meets customer needs. Many authors indeed characterize solutions as heterogeneous, intangible problem solving processes (Sawhney, 2006; Davies *et al.*, 2007; Skarp and Gadde, 2008; Brax and Jonsson, 2009). Arguably, the entire solution is, from the customer viewpoint, foremost a service process characterised by interaction and co-creation. Therefore, it is evident that adopting a service framework for studying solutions could bring important insights into how solutions can be co-created more effectively.

Solution research acknowledges that the development and provision of integrated solutions necessarily involves collaboration between multiple actors, either within or between organisations. A solution supplier needs the ability to integrate the resources and processes of its different functions, units or departments that are typically responsible for different phases or parts of the solution (Tuli *et al.*, 2007; Storbacka, 2011). Companies may also form partnerships with other organisations to access complementary resources, products or services (Foote *et al.*, 2001; Miller *et al.*, 2002; Syson and Perks, 2004; Windahl and Lakemond, 2006). In other words, solutions are co-created within either intra- or inter-organizational networks in which actors integrate and apply resources (Gummesson and Mele, 2010; Lusch *et al.*, 2010).

The organisation and management of the collaboration between the different actors is critical for the effectiveness of a solution (Tuli *et al.*, 2007). According to Windahl and Lakemond (2006), relationships within a firm and with its external partners can both enable and obstruct the development of solutions. Nevertheless, the ways in which collaboration between actors that develop joint solutions affect the customer experience and the outcomes of a solution have yet to be sufficiently understood or fully established. Research focus on solutions as a strategy for manufacturers to augment their products has directed empirical studies to take the perspective of the focal solution supplier

(Matthyssens and Vandenbempt, 2008; Ulaga and Reinartz, 2011). At the empirical level, few investigations have been made to study the perceptions of several supplier firms delivering integrated solutions, or to reveal how customers actually respond to such offerings (Evanschitzky *et al.*, 2011).

This paper addresses the above noted gaps in the solutions literature by examining the creation of solution offerings through a service concept framework. More specifically, “the purpose of this paper is to identify the critical factors affecting the effective co-creation of customer-focused solutions within business networks.” We study two different cases in which several suppliers and their customers jointly create solutions to meet customer needs, and, by use of rich empirical data, we explore the factors that affect the co-creation of solution content, operations and processes, customer experience, and value from the viewpoint of the customer and the different suppliers. The focus is on solution co-creation within business networks, defined as “a set of companies and potentially other organisations connected to each other for the purpose of doing business” (Halinen and Törnroos, 2005, p. 1286). More specifically, these business networks are formed by actors that integrate and apply resources through interaction (Lusch and Vargo, 2006; Lusch *et al.*, 2010).

This paper contributes to the solutions literature by studying solutions as a network level process of resource integration between multiple suppliers and their mutual customers. New knowledge is created by applying a service concept framework to the study of integrated solutions, which directs attention to the factors influencing the relational and interactive processes that are critical for the customer’s perception of solution effectiveness and value outcomes. A contribution is also made by studying the co-creation of solutions originating from service industries, which is a rarity as most solutions literature has predominantly studied product-service bundles (Nordin and Kowalkowski, 2010).

The paper is organised as follows: the next section outlines the theoretical framework for the study, followed by methodology and description of the cases. Then we present the findings that analyse the co-creation of two solutions with the lens of a service concept, and identify the critical factors that affect effective solution co-creation. The final sections of the paper discuss the conclusions, contribution and implications of the study.

Integrated solutions through the service concept “lens”

In this study, “solution” refers to a process during which product, service, and/or knowledge components are integrated into offerings that meet needs of a specific customer or type of customer (Miller *et al.*, 2002; Storbacka, 2011). Although the components of the solution may be standardised, customers typically participate in the specification and implementation of solutions (Brady *et al.*, 2005). In other words, solution offerings are “co-produced” as they involve shared inventiveness, problem solving, co-design, or shared implementation with customers and other partners in the network (Lusch and Vargo, 2006). We use the term “solution co-creation” to refer to the interactive process where actors – the suppliers and their customer – jointly create the solution offering by integrating resources.

The service literature acknowledges that companies cannot develop or sell services as such, but can offer opportunities for service, which is realized in unique co-creation processes with somewhat different outcomes (Edvardsson and Olsson, 1996; Grönroos, 2000). The development, delivery, usage and evaluation of services involve

both the content of the solution and the processes by which it is created (Edvardsson and Olsson, 1996; Lapierre, 1997; Grönroos, 2000; Whittaker *et al.*, 2007). A “service concept” is a framework used in the service development and design literature to denote the “what” and “how” elements that constitute a service (Edvardsson and Olsson, 1996; Edvardsson *et al.*, 2000; Goldstein *et al.*, 2002; Johnston and Clark, 2008). The most commonly cited dimensions of a service concept include:

- the core content of the solution, the essence of the service that meets the customer need;
- the operations and processes needed to create the solution;
- the customer experience of the process; and
- the outcome of the service, and its value to the customer (Clark *et al.*, 2000; Goldstein *et al.*, 2002; Johnston and Clark, 2008).

In the case of integrated solutions, the interaction and resource integration by multiple network actors affect these elements. Next, we apply the service concept framework to extant knowledge on solutions offerings:

- The core content of the solution refers to the essence of the offering that solves a customer problem and fulfils their need. In the context of providing a solution, it refers to the combination of resources – products, services, and/or knowledge components – that are integrated in order to meet customer specific needs better than the purchase of individual parts would (Sawhney, 2006; Davies *et al.*, 2007; Tuli *et al.*, 2007; Brax and Jonsson, 2009). Past research indicates that the interaction and co-operation between network actors may affect the solution content. Windahl and Lakemond (2006) and Tuli *et al.* (2007) point out that unclarity regarding the network actors’ roles and responsibilities in defining the core content of the solutions may hinder the decision of the scope of the offering. A number of studies indicate that effective interaction and dialogue is often needed to gain understanding of the customer’s value processes and needs that the customer may not be able describe explicitly (Tuli *et al.*, 2007; Nordin and Kowalkowski, 2010; Aarikka-Stenroos and Jaakkola, 2012). Despite emphasising customer specific needs and customer focus, the solutions literature provides scant knowledge on how actors collaborate when defining optimal solutions and combination of resources for meeting customer requirements.
- Service operations and processes refer to the chain of activities needed to integrate resources by various actors into a solution (Edvardsson and Olsson, 1996). Solution co-creation involves identifying, accessing and integrating the different elements of a solution, which are increasingly provided by an actor’s external network (Davies, 2004). A common way to organise operations in solutions business is to divide the work between front-end units (customer facing units) and backend units (Foote *et al.*, 2001; Miller *et al.*, 2002; Galbraith, 2002; Davies *et al.*, 2006). Tuli *et al.* (2007) report that some companies determine the unit taking charge of the solution in a flexible manner to ensure that in each case the unit with the best expertise to meet a particular customer’s need will have authority and responsibility over the process (Tuli *et al.*, 2007). The organisation of resource integration is relevant particularly in the network context, as the network position

of an integrator or a supplier may affect its ability to influence the project and interact with the customer (Windahl and Lakemond, 2006).

- Customer experience refers to the customer's perception of the service operations and processes (Clark *et al.*, 2000; Johnston and Clark, 2008). Integrated solutions depart from traditional bundling in terms of the seamless combination of its elements, in other words, the smooth and coherent coordination and integration of resources (Kingman-Brundage *et al.*, 1995; Brax and Jonsson, 2009). According to Tuli *et al.* (2007), customers view the lack of coordination as a key weakness common to many suppliers. It appears that customer experience may be affected by the co-creation processes among the supplier firms, and not only between the customer and the group of supplier firms. Studying the perceptions of all the actors involved in the solution process is therefore of key importance.
- Service outcome is what the customer actually receives as the results of the service, and the benefit or value the customer perceives (Edvardsson and Olsson, 1996). Lapiere (1997) found that buyers of business services evaluate not only the immediate outcomes of the service process, but also their influence on business in the longer run, i.e. the value-in-use perceived by the customer. The value-in-use emerges during usage, when the customer integrates the solution into its own processes (Vargo and Lusch, 2008; Grönroos, 2011b). In the solution context, suppliers can engage in extensive, relational interaction with their customers, thereby actively influencing the emergence of value (Grönroos, 2011a, b). Value of the solution outcomes is therefore the result of both the content of a solution and the process through which it is created (Nordin and Kowalkowski, 2010; Aarikka-Stenroos and Jaakkola, 2012), and it involves the integration of resources by the customer and multiple suppliers (Windahl and Lakemond, 2006; Storbacka, 2011). Gummesson and Mele (2010) suggest that effective resource integration is characterised by a good fit between resources, activities and processes, and postulate that such matching is critical for value creation. As extant solutions research has mainly addressed the value implications of augmenting products with services, less is known about the value perceived in the resource integration itself. This raises the questions: How do customers respond to suppliers taking charge of selecting and combining the components of the solutions? How does the integration carried out by suppliers affect customer value creation?

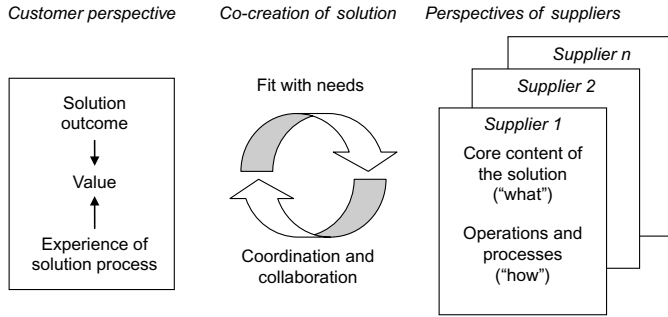
Figure 1 summarises the theoretical discussion. The service concept elements link together the “what” and “how” dimensions of the solutions and direct attention to how a customer perceives a solution. In this study, we examine the factors that affect the co-creation of the solution content, process, customer experience, and value from the viewpoint of the customer as well as all the suppliers (Figure 1).

Methodology

Research strategy

We used qualitative, multiple case studies to study the co-creation of integrated solutions in a business network context. Qualitative methodology and case studies are widely used in management research (Gummesson, 2000) for studying previously under-investigated topics and gaining an understanding of phenomena that have complex and multiple variables and processes (Yin, 2003). Building theory from case

Figure 1.
Tentative framework for
the study



studies was chosen as the research strategy in order to create theoretical propositions inductively from case based, empirical evidence (Eisenhardt and Graebner, 2007).

Case selection and case descriptions

To explore the factors that impact the effectiveness of the co-creation of integrated solutions within business networks, we relied on theoretical sampling (Silverman, 2006; Eisenhardt and Graebner, 2007) and identified two solutions which were to be co-created within business networks by several companies. The two networks contain 13 companies – eight supplier companies and five customers. Some of the supplier companies participated in a large service research project, which facilitated our access to the companies. The study was conducted from November 2009 to December 2011.

We selected cases that differed in their content, business domain and nature of solution, so as to expand the external generalizability of the findings (Eisenhardt, 1989; Yin, 2003). Case A, here called Industrial Solution, is a solution that combines robots, machine tools and industrial services to meet the needs of small and medium sized manufacturers. The solution was developed in collaboration between two suppliers (A1 and A2) and two potential new customers. Supplier A1 was in charge of solutions integration, sales and marketing, maintenance services and customer relationship management (CRM). The partner company (Supplier A2) was responsible for providing the technical solution, documentation, technical support, training the personnel of solutions integrator A1, and providing assistance during the assembly phase and maintenance work.

Case B, here called Marketing Solution, is a highly customized knowledge-intensive service solution offered by a group of companies operating in the field of marketing services. The solution combines the resources of six professional service firms (B1-B6) offering marketing, advertising, media planning, CRM, business consultancy and printing services. The companies are part of a group, i.e. they are at least in part owned by the same parent company, but they operate as independent firms. Each company has its own business, but they jointly offer integrated marketing solutions with a "one door" principle. The network has evolved organically to allow the entrance and exit of new companies, but the core companies have co-operated for decades. We studied solutions co-created with three different customers (B1-B3).

Data collection

In order to compensate for the lack of previous empirical research on this topic, the main data collection method employed involved in-depth interviews (Fontana and Frey, 1994). However, as is typical for theory building research (Eisenhardt, 1989), we have combined multiple data collection methods. The rationale for using several data collection methods and basing the study on several different sources was triangulation, which produces more accurate findings and conclusions (Eisenhardt, 1989; Yin, 2003). The sources for data collection were comprised of 13 firms and 66 informants. In Case A, data were collected from two supplier firms and two customer firms. The data sources for Case A included 23 interviews and 14 workshops or meetings. For Case B, data were collected from six supplier firms and three customer firms. The data sources for Case B included 28 interviews and seven workshops or meetings.

To study the co-creation of the solutions we interviewed both supplier and customer representatives. The interviewees selected for the study hold key positions in their respective firms concerning the solutions studied. We asked the interviewees to talk about their views and experiences regarding the solution process, co-operation between the actors and other issues that affect the co-creation of the solution. We allowed the interviewees free reign to express their views and raise new issues by asking open-ended questions (Yin, 2003). Thus, the interviews were guided conversations rather than structured queries, that allowed the interviewer to take advantage of the naturally occurring data (Silverman, 2006). To increase the reliability of research, the interviews were recorded, transcribed, and data extracts are presented when the findings are reported (Silverman, 2006). The interviews lasted between 31 and 89 minutes. Table I outlines the data collected through in-depth interviews.

In addition to interviewing, the researchers gathered data by observing and participating in 21 working groups, meetings and business negotiations between the companies (Table II). In such events, the companies discussed issues related to the development and delivery of solutions, challenges and ideas for developing solutions and co-operation. We documented the company workshops and meetings by taking notes.

Data analysis

Data analysis was guided by the tentative theoretical framework (Figure 1) devised by drawing on a broad range of solutions literature and service management and marketing literature, which is especially important in theory building research where findings are often based on a limited number of cases (Eisenhardt, 1989). The theoretical framework provided a loose framework that allowed new issues to arise inductively. We applied theoretical propositions as the analytic strategy (Yin, 2003) and the purpose of our study led us to analyse the data through the questions: "How do companies co-create integrated solutions? How do the customers perceive such solutions?" We analysed within-case data and let the unique patterns of each case emerge before systematically searching for cross-case patterns (Eisenhardt, 1989) and comparing findings between the cases. Data were categorised according to four dimensions of the service concept: the core content and outcomes of the solution ("what"), and service operations, processes and customer experience ("how"). Finally, we identified the factors that emerged as critical with regard to solution effectiveness.

Table I.
Overview of the in-depth
interviews

Company (business field)	No. of interviews (<i>n</i>)	Position of interviewees
Supplier A1 (solutions integrator, machine retailer, industrial services)	<i>n</i> = 17	CEO, directors of the business units, repair and maintenance engineer, repair and maintenance personnel, sales manager, sales personnel
Supplier A2 (automation manufacturing, industrial services)	<i>n</i> = 4	CEO, director of the business unit, marketing manager, R&D manager
Customer A1 (manufacturing industry)	<i>n</i> = 2	Production engineer, supervisor
Supplier B1 (marketing)	<i>n</i> = 2	Group CEO, group's development manager
Supplier B2 (advertising)	<i>n</i> = 9	Digital strategy director, three client directors, project manager, project planner, two copywriters, art director
Supplier B3 (media planning)	<i>n</i> = 5	Senior client director, three client directors, planning director
Supplier B4 (CRM agency)	<i>n</i> = 2	CEO, art director
Supplier B5 (business consultancy)	<i>n</i> = 1	CEO
Supplier B6 (printing)	<i>n</i> = 1	CEO
Customer B1 (food industry)	<i>n</i> = 6	Marketing director, marketing manager, brand manager, two product group managers, product manager
Customer B2 (travel services)	<i>n</i> = 1	Company director
Customer B3 (food industry)	<i>n</i> = 1	Regional director
	<i>n</i> = 51	

Findings

Core content and outcomes of the solution

In the Industrial Solution case, the two companies had recognised a customer need that was common among SME-sized manufacturers. They involved customers in the development process to deepen their understanding of customers' business processes, future investment plans, and factors that customers valued in maintenance services. The suppliers openly combined their views and customer insight to develop the idea of the core content of the solution to meet the identified customer need. Due to well-defined needs, the content of the solution could be standardised to a large extent. The resources of the two supplier companies complemented each other and there were no disagreements on the core content of the solution or the combination of resources required to create it. As a manager representing Supplier A2 stated, "We saw a lot of synergies rather than a collision of interests."

In the Marketing Solution case, customer needs were rather heterogeneous and therefore require defining on a case-by-case basis. Typically, some of the service suppliers meet a customer in a briefing where problems and needs are described. Then the service suppliers ideate the core content of the solution together with the customer. The suppliers explained that customer explanations of the problem to be solved would vary in their clarity. Sometimes the customer may not have a clear vision of their own needs and problems, therefore the ideation would proceed through an intense dialogue between the network actors. Sometimes the customer has a ready solution in mind, and asks certain service suppliers to deliver a solution. The customer and supplier

Event and participating companies	Participants (<i>n</i>)	Focus of the event and data collection
Customer meeting: Supplier A1 and Customer A1	<i>n</i> = 3	Business negotiation. Customer needs and the solutions Supplier A1 offers
Joint workshop: Suppliers A1 and A2	<i>n</i> = 6	Service business aims, product and service offerings, technical specifications of the robot
Customer meeting: Supplier A1 and Customer A2	<i>n</i> = 5	Business negotiation of a possible new contract
Joint workshop: Suppliers A1 and A2	<i>n</i> = 2	Discussing benefits of an integrated solution, sharing of customer information and analysing markets, division of roles and tasks for the collaboration
Joint workshop: Suppliers A1 and A2	<i>n</i> = 4	Benefits of an integrated solution, sales arguments, common launch and marketing plans
Internal workshop: Supplier A1	<i>n</i> = 4	Company strategy day, market analysis
Joint workshop: Suppliers A1 and A2	<i>n</i> = 3	Summing up previous discussions. Discussing aims and model for collaboration
Internal workshop: Supplier A1	<i>n</i> = 7	Motives for developing service business, benefits of the solution and sales arguments
Internal workshop: Supplier A1	<i>n</i> = 6	Motives for developing the service business, development needs for the repair and maintenance organisation
Internal workshop: Supplier A1	<i>n</i> = 2	Suppliers' role in the customer's value creation process
Internal workshop: Supplier A1	<i>n</i> = 2	Suppliers' role in the customer's value creation process
Internal workshop: Supplier A1	<i>n</i> = 1	Mapping the service processes of A1 and A2 with a service blueprint
Internal workshop: Supplier A1	<i>n</i> = 3	Wrap-up of the development project, discussion on the results
Internal meeting: (Supplier A1)	<i>n</i> = 8	Presenting the results of development project to the board of directors and the owners of the company, verification of the findings
Meeting between members of the supplier network: Suppliers B1-B3	<i>n</i> = 5	Discussion about the aims of the development project
Joint workshop: (Suppliers B1-B6)	<i>n</i> = 8	Functioning of the co-operation and development needs
Joint workshop: (Suppliers B1-B3)	<i>n</i> = 4	Value of the integrated solution
Joint workshop: (Suppliers B1-B3)	<i>n</i> = 5	Defining and describing the content and process of the solution
Joint workshop: (Suppliers B1, B3, B4)	<i>n</i> = 3	Suppliers' role in the customer's value creation process
Joint workshop: (Suppliers B1, B2, B4)	<i>n</i> = 6	Wrap-up of the development project, discussion on the results
Internal workshop: (Supplier B1)	<i>n</i> = 2	Reviewing the implemented actions performed in relation to the development project

Table II.
Overview of the data
collected through
observation

interviews indicate that customers differ in their willingness to share openly information about their goals, needs and expectations, which affects the need diagnosis and solution formulation. In other words, the clarity of the customer problem, the scale of the solution, and the degree to which customers wish to analyse their problem with

the suppliers varies, which made it difficult for the suppliers to decide which firms or functions to involve in the briefings:

If we involve too many, customers would regard it as expensive and a waste of resources. If we involve too few, we may lack a rich variety of competences for the ideation phase. (Supplier B2).

The suppliers of the Marketing Solution faced several challenges in agreeing on the core content of solutions. The suppliers had partly overlapping competences, which caused rivalry, and sometimes the firms had different views on the “best” solution to customer’s problem, as the following quote illustrates, “Nowadays, we may have tens of members in project teams coming from different companies. They all talk about different ways to solve [customer] problems.” (Supplier B1). The firms tended to emphasise the importance of their own particular resources in the formulation of solution, which was noted by the customers, too:

Depending on whom I contact when we start planning something new, it basically defines the choice of the [media] channel. If we choose company B2, the solution is to use traditional media, but, on the other hand, B4 goes for new media and promotions. (Customer B1).

They recognised the risk that the solution would be defined according to one supplier company’s own business interests and resources, instead of the customer’s problems and needs in general. Some of the supplier companies also pointed out that their partners simply may not have sufficient knowledge and understanding of the resources they could offer, thus they were occasionally excluded from this critical phase.

Interviews with suppliers and customers indicate that the value associated with a solution co-created within a network was not always clearly defined or communicated. In the Marketing Solution case, the benefits accrued by the integration of broad resources into seamless solutions was not actively highlighted when selling a service. Furthermore, customers were not totally convinced of the value they received when they bought a “total” solution through a one door shopping principle, and sometimes preferred to purchase separate service modules from several companies. However, the customers mentioned that the improvement of the integration of their marketing communications had benefitted them, i.e. the solution accrued more value than separately purchased parts would have done.

In both cases, the interviewed customers explained that the possibility to centralise their purchases and the ease of buying with a one door shopping principle are the major benefits. Customers save time and effort when they do not have to coordinate the palette of suppliers: “It does make our life easier as we do not have to inform every party so much, as they know themselves what they do and what they deliver to us.” (Customer B1). They obtain the varying combinations of competences they need from one contact person and are able to utilise the innovation potential of several companies in ideating new kinds of solutions.

Service operations, processes and customer experience

In both of the studied cases, the suppliers considered it important to agree on the role and task division, to plan the operations and processes of the solution co-creation, and to commit to delivering a seamless customer experience. Our data indicated that the division of roles (i.e. the leader role and the role of partners) and managing the common customer interface were central, although challenging issues for the suppliers.

In the Industrial Solutions case, the suppliers easily agreed on the role division at the beginning of the solutions development project, because the elements of the solution were quite standardised and the firms' competences and business interests complemented each other. Due to the standardised nature of the solution, the firms were able to map and schedule the service process, which helped them attend to the management of the common customer interface and design customer participation in the solution process. Although Supplier A1 was mainly in charge of the front-end operations, the partner also performed some assembly and repair tasks on the customer interface. However, this was seen as something that increased the risk of an incoherent service experience, as a representative of Supplier A1 stated, "It's always risky to let a partner's personnel work under our brand."

The role division between the Marketing Solution supplier firms was not as clear as in the Industrial Solution and varied across customer projects. The service suppliers sometimes competed over responsibility for project leadership. Each company's own business goals made closeness to the customer desirable: "Of course everybody would like to 'own' the customer relationship." (Supplier B3). Clear role division was also complicated by the partial overlap in the firms' competences and resources. Whilst all the supplier companies acknowledged the value potential of co-creating solutions with a network of partners, they admitted not always being committed to the common goals of the network, which was something noticed also by the customers:

No matter how much they say they operate as a network, we can still read between the lines that they compete with each other. If it [operating as a network] is their desired state, it should be the desired state for all the companies. (Customer B1).

In other words, the disagreements of the role division between service suppliers confused the customer and hindered the coherent service experience and delivery of a seamless solution in the eyes of the customer. On the other hand, many interviewees pointed out that when there was rapport and trust between individuals, co-operation was smooth and rewarding.

In the Marketing Solution case, the suppliers considered it challenging to plan and define the service operations and processes in detail because of the highly knowledge-intensive and customized nature of the solution. The problems of planning and scheduling, as well as a lack of understanding of the partners' processes and business caused problems in solution co-creation, as described by Supplier B4:

[...] they don't always remember to keep us posted . . . they decide things and do not even tell us, just expect us to deliver it. Finally, we have too little time to plan and execute our part of the project.

Trust in another partner's competence seemed an important condition for smooth co-operation. If a supplier was unsure of their partner's capabilities, they were unwilling to share the customer interface: "Good or bad, the network will share a common image and reputation" (Supplier B3).

In the Industrial Solution case, the service demands little effort from customers as the installation as well as repair and maintenance services take place mostly without the personnel of the customer company being involved. Customers can be confident in knowing beforehand how the process proceeds and what they get as an outcome. In the Marketing Solution case, extensive customisation and customer participation in the solution co-creation makes it difficult to define explicitly the outcome in advance.

Some of the interviewed suppliers explained that the resources and processes of the customer's organisation directly influence their work. They noted that if the customer has carefully designed processes, it is easier to predict who provides or needs certain resources, and in which phase of the process. Ambiguous processes result in uncertainty and increase the amount of risk perceived by all the actors in a network, which also affects the customer experience. On the other hand, customer involvement in the process and their interaction with the suppliers may be a positive experience and an important source of value for the customer. Customer B2 remarked:

It's been very important for us that we've found the kind of partner with whom we've been able to spar [...] we get to know of different kinds of possibilities that we may not have noticed or understood by ourselves. [...] We couldn't do this by ourselves. When we're open and honest about our challenges and do this together, the end result is better.

Our data indicate that customers may vary considerably in their willingness to participate in the process and have differing expectations of the co-creation process.

The solution process seems to be affected also by customers' desire for control. The interviewed suppliers of the Marketing Solution explained that sometimes customers even want to select the composition of a project team according to their preferences, as a representative of a Supplier B2 described, "We cannot switch or take new members in project teams without the customer's permission. This business is all about people and the relationships between them." Supporting that observation, Customer B3 stated, "We want to know who is behind each part of the service and to make sure that they use the best talent." Customer's desire for control increased challenges in resource planning among the supplier companies.

In the Marketing Solution case, customers strongly emphasised the importance of personal relationships and chemistry between people, which seems significantly to affect their value perceptions. In contrast, a representative of Supplier A1 in the Industrial Solution case stated, "The customer is not interested in what kind of network exists 'behind' the service, but in the outcome they get." However, Supplier A1 admitted that – especially concerning completely new solutions – a customer may demand more information about the resources of solutions partners in order to ascertain their ability to deliver the solution.

Summary of findings: factors affecting effective solution co-creation

Figure 2 summarises our findings regarding the factors that affect effective co-creation in a business networks comprising a customer and its suppliers that integrate resources into solutions. Our study demonstrates that customer-related factors influencing the co-creation of solution relate to the uniqueness and the clarity of the customer problem to be solved, and customer expectations regarding their role in co-creation process and its value outcomes. The observation that a customer's activities of participating in and attempting to control the solution process may significantly affect the co-creation process was especially noteworthy.

In terms of supplier-related factors, we found that co-creation of the solution is affected by the scope and the complementarity of the resources of the suppliers, and their mutual relationships in terms of trust, openness in sharing customer information, and understanding of each other's resources and business. The solution process appeared to be significantly influenced by the suppliers' commitment to common goals, the value they perceived in the co-operation itself, and the organisation of the

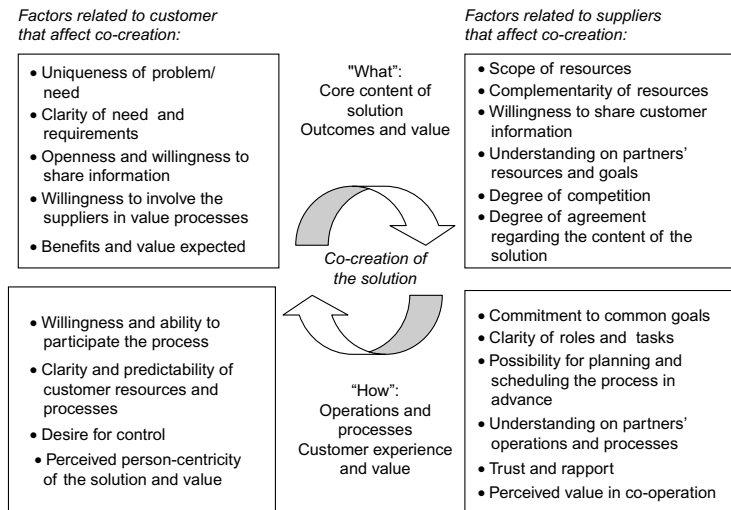


Figure 2. Factors that affect the co-creation of integrated solutions within business networks

co-creation process, particularly the clarity of role division among the suppliers. Our data suggest that co-creation effectiveness may sometimes be compromised if the suppliers' own business interests and resources overrun the customer's expectations for value and service experience.

Our data also indicated that the relevance of the identified factors might depend on the nature of the integrated solution itself, most importantly on the degree of intangibility and customisation and the scale of the solution. The more knowledge-intensive, intangible and customized the solution is, the more collaboration and interaction between all the network actors may be needed in defining the core content of the solution and the planning of the solution process.

Conclusions, limitations and research implications

The purpose of this paper was to identify the critical factors affecting the effective co-creation of customer-focused solutions within business networks. This was accomplished by drawing on extensive empirical data that investigated all the actors within two business networks co-creating solutions. We analysed solution co-creation through a service concept framework, which depicts the core content of the solution, the operations and processes to deliver the solution, and the outcome and value accrued for the customer (Edvardsson and Olsson, 1996; Goldstein *et al.*, 2002; Johnston and Clark, 2008). As the result of the study, we defined the factors that influence the effective co-creation of integrated solutions within a business network context from both the customers' and suppliers' perspectives.

The examination of the perceptions of multiple supplier firms and their mutual customers revealed that co-creation among the supplier firms affects the content and value of the solution as well as the customer experience of the solution process.

Co-creating solutions that meet customer needs requires suppliers to have a shared understanding of the customer problem and expectations regarding the process. Especially the degree of competition, the clarity of the role division and the rapport among the supplier firms are critical for solution effectiveness as these factors influence customer experience regarding the solutions process and its outcome. Effective co-creation with the customer requires that suppliers understand of not only the customer needs regarding the core solution content, but also of the customer's preferences regarding their role and control in the co-creation process.

Previous research has indicated that the relationships and coordination between solution suppliers may affect solution delivery and its effectiveness (Windahl and Lakemond, 2006; Tuli *et al.*, 2007). However, this study is among the first that have studied the perceptions of an entire business network co-creating the integrated solution. Thereby it contributes to previous knowledge by examining how suppliers integrate resources, and how customers respond to, and participate in the co-creation of solutions. Our study shows that in order to co-create effective customer-focused solutions, firms need to create a fit between not only the offering and the customer need and value expectations, but also between the goals, preferences, and resources of the supplier firms. We propose that this is a prerequisite for co-creating seamless solutions that provide more value than the parts alone (Brax and Jonsson, 2009).

By applying a service concept framework to analyse integrated solutions, we directed attention to the factors influencing the relational and interactive processes that are critical for the customer's perception of solution effectiveness (Tuli *et al.*, 2007). The results especially highlighted the importance of suppliers' commitment to common goals as it affects the coherency of customer experience. The study showed that in order to co-create customer-focused solutions, the supplier firms need to adjust the solutions content and the co-creation process according to the customers' heterogeneous value expectations. Some customers may primarily seek to accrue value from the effective coordination of the network performed by one of the suppliers, while others may primarily expect to explore new options and develop new solutions by integrating various resources within the business network. These findings contribute to previous research that emphasise the relational and interactive nature of solutions (Tuli *et al.*, 2007; Skarp and Gadde, 2008; Brax and Jonsson, 2009) but have not elaborated on the factors that affect customer experience of co-creation. By studying solutions with a service concept framework, we drew attention to factors that are relevant for the co-creation of more effective, customer-focused integrated solutions.

As most solutions literature has studied product-service bundles (Nordin and Kowalkowski, 2010), this study also contributes by studying the co-creation of solutions originating from service industries. The comparison of the co-creation of two different types of solutions indicated that the more knowledge-intensive and customized a solution is, the more critical for solutions effectiveness it is that suppliers gain a mutual understanding on the customer need, the content of the solution and the co-creation process. However, the results indicate that when the solution requires customized problem-solving, it is more difficult for suppliers to reach a consensus because the range of potential resources is more varied and it is more difficult to predict the solution process.

This study provided insight into two cases that represent an extensive and complex phenomenon of co-creating customer-focused solutions within business networks. With the case study approach, it is possible to reach an interpretation that could be

transferable into other cases of a similar type (i.e. analytic generalization), but not to enumerate frequencies (i.e. statistical generalization) (Hirschman, 1986; Yin, 2003). By selecting solution cases that varied in their content and business domain, we sought variation that could expand the generalizability of the findings (Eisenhardt, 1989; Yin, 2003). In reporting the findings, we indicated differences and similarities between the cases, which facilitates interpretation of the applicability of the results: the findings concerning solution co-creation in the Marketing Solution case are likely to be applicable to other knowledge-intensive, customized solutions, whilst the findings regarding the Industrial Solution should apply to more standardised solution contexts. The main purpose nevertheless was to identify a range of factors that may influence solutions effectiveness, so that depending on the context, other studies are likely to find something similar, although not identical (Payne and Williams, 2005). To strengthen the generalizability of our study the relevance of the identified factors could be tested by replicating the study in cases representing different kinds of solutions and business networks compared to the cases in this study (Eisenhardt, 1989; Yin, 2003). Thus, this limitation also opens up interesting possible avenues for future research.

Our findings indicate that further empirical research is needed to examine how companies could overcome challenges and reap the opportunities arising from the factors that affect the effective solution co-creation identified by this study. First, future research could address how actors in different types of solution networks could co-operate more effectively when analysing customer needs, and formulating a solution. The second area for future research relates to the role of supplier companies and the division of tasks between them. This is a critical issue as it affects the content of the solution, i.e. how companies discover the best fit between customer needs and the solution offering; as well as the customer experience, i.e. how the suppliers manage the common customer interface. Another question to be asked is: How should the network be organised to ensure the best resource combination for each customer project, avoid conflicts or turn them into fruitful sparring, and respond to varying customer preferences in a flexible manner? A further important issue is to study the value of an integrated solution: What are the value drivers that motivate suppliers to engage in the co-creation of solutions? How can companies document, concretise, and demonstrate the value potential of a solution? How do solutions delivered by several suppliers contribute to the customer's value creating processes?

Managerial implications

Our study suggests that despite the type of the solution, i.e. product or service based, the alignment of all the service concept elements (the content of the solution, operations and processes, customer experience and value) is essential for effective solution co-creation within a business network context. Therefore, all the actors in a business network should have a shared view of the type of solution needed, the operations and processes required for its creation as well as the intended outcome. Companies need some kind of framework within which they can design, define and sell integrated solutions, although a solution will always be somewhat customized for every customer.

We suggest that a collaborative, integrative management approach is required in which all the network actors reach a shared view of the solution, thereby achieving a fit between a customer's needs and the solution offered. We suggest that a commonly defined, discussed, and documented service concept is a suitable integrative framework for the integrated solutions context (Table III). The framework draws

Table III.
Important activities for
suppliers when
co-creating integrated
solutions

Service concept element	Managerial advice
Service value	Share customer insight and experiences to define the individual customers' value processes and drivers Define the value potential of the solution for the individual customer or certain customer type Concretize the value potential of the solution to the customer
Core content of the solution	Encourage the customer to share information about their needs and problems to be solved Utilise common customer understanding to proactively identify customer needs Define and select optimal combination of resources to fit the customer need
Service operations and processes	Agree on the role and task division between the supplier companies Map solutions delivery operations and processes according to customer preferences regarding participation and control Facilitate trust and rapport between suppliers
Customer experience	Define the degree of interaction, dialogue and ideation the customer expects and adjust the co-creation activities accordingly Commit all the suppliers to delivering a seamless customer experience common customer interface

attention to the fact that all the elements of a solution are intertwined and should be developed in parallel. It will also help to reconcile the views, motives and resources of different stakeholders in an explicit way, thus facilitating the co-creation processes at the common customer interface, as well as enabling selling and marketing processes by solution suppliers.

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Co-creating
customer-
focused solutions

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ARTICLE III

**Co-creating
integrated solutions
within business networks**
The KAM team as knowledge integrator

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Co-creating integrated solutions within business networks: The KAM team as knowledge integrator



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ABSTRACT

This study derives from a need that is both practical and theoretical: the need to increase knowledge of how KAM teams might ensure more successful value co-creation with their business customers in the service sector. The KAM teams in this study are formed of members originating from several supplier companies that integrate and apply resources with their customers in a business network. In the co-creation of integrated solutions within such business networks, KAM teams – drawing on organizational learning theory and knowledge management – are considered as knowledge integrators. The purpose of this study is to analyze the KAM teams' absorptive capacity – that is, how knowledge is acquired, assimilated, and applied in the co-creation of integrated solutions. The study employs a qualitative case study approach, based on 30 in-depth interviews in nine supplier companies operating in advertising, marketing and consulting, and in three key customer companies. The study contributes to the KAM literature by providing new conceptual understanding and empirical insight in respect of networked co-creation of integrated solutions and the influence of the KIBS context on the solutions process.

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1. Introduction

Key account management (KAM) is regarded as a natural development of customer focus and relationship marketing in business-to-business markets (McDonald, Millman, & Rogers, 1997; Wengler, Ehret, & Saab, 2006). The KAM approach is gaining major relevance for supplier companies as customers continue to seek increasingly comprehensive solutions (e.g. Matthyssens & Vandenbempt, 2008; Skarp & Gadde, 2008) and fewer suppliers, as demonstrated by the growing trend in recent decades (Guesalaga & Johnston, 2010). The KAM approach, as adopted by a selling company, aims at building a portfolio of loyal key accounts by offering, on a continuing basis, product/service packages tailored to customers' individual needs (McDonald et al., 1997; Millman, 1996). To coordinate day-to-day interaction under the umbrella of a long-term relationship, selling companies typically form KAM teams headed by a key account manager (Millman, 1996).

Another widespread approach to coping with increased competition, and more extensive customer needs within business-to-business markets, is the provision of integrated solutions (e.g. Brady, Davies, & Gann, 2005; Davies, Brady, & Hobday, 2007; Nordin & Kowalkowski, 2010; Tuli, Kohli, & Bharadwaj, 2007). Where a single company is unable to provide the solution to a customer problem, complementing resources are acquired through partnerships. Actors then integrate and apply resources through interaction to co-create value within networks (Ballantyne & Varey, 2006; Baraldi, Gressetvold, & Harrison, 2012; Cova

& Salle, 2008; Gummesson & Mele, 2010; Jaakkola & Hakanen, 2013; Lusch & Vargo, 2006). Solutions research has recently expanded from the study of product-based solutions to include 'pure' service solutions, such as integrated solutions comprising knowledge-intensive business services (KIBS) (Jaakkola & Hakanen, 2013).

Both development of integrated solutions to meet business customers' needs and application of the KAM approach have become commonplace in several companies and business fields. Essentially, the KAM approach enables business customers to purchase integrated solutions through the "one-stop shop" principle for extensive needs that cannot be fulfilled by any single product or service. KAM research nevertheless remains silent with regard to networked co-creation of integrated solutions. Furthermore, studies concerning industrial companies are strikingly dominant in KAM research (e.g. Hutt & Walker, 2006; Millman, 1996; Millman & Wilson, 1995, 1996; Workman, Homburg, & Jensen, 2003), with only a few studies having been conducted exclusively within knowledge-intensive business services (KIBS) (Nätti, Halinen, and Hanntu, 2006; Sharma, 2006). Given the rising importance of services within the economy, and the companies' aim of achieving competitive advantage through the KAM approach, there is a need to increase understanding of how KAM teams co-create integrated solutions with their customers within business networks.

A central feature of KIBS is utilization of knowledge in the interest of doing business (Miles et al., 1995). KAM teams operating in KIBS occupy a central role in knowledge utilization, orchestrating a network of suppliers and customers and knowledge flows among the actors. How well KAM teams are able to utilize knowledge, however, depends on

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their absorptive capacity – the ability to acquire, assimilate, and apply knowledge to commercial ends (Cohen & Levinthal, 1990; Lane & Lubatkin, 1998; Lane, Salk, & Lyles, 2001; Zahra & George, 2002). This study regards absorptive capacity as a central capability of a KAM team operating in KIBS. Its purpose is therefore to address the way in which KAM teams acquire, assimilate, and apply knowledge in the co-creation of integrated solutions within business networks, and to establish the related influence of the KIBS context. Concurrently, the study outlines central KAM team activities for ensuring effective knowledge utilization. For study purposes, a business network consists of supplier companies – from which the KAM teams are formed – and their common customer companies.

Drawing on organizational learning theory and knowledge management, this study contributes to the KAM domain (e.g. Hutt & Walker, 2006; Ojasalo, 2004) by building conceptual understanding with regard to KAM teams operating as knowledge integrators in networked co-creation of knowledge-intensive integrated solutions. The study suggests that the entire solutions process, from sales and ideation to the implementation of the solution, builds upon knowledge acquisition, assimilation, and application. As another finding, the central role of tacit knowledge became evident in marketing and advertising; both needed customer insight and content of service offerings highly based on tacit knowledge. Consequently, this study contributes to the KAM literature by studying the way in which integrated solutions are co-created within KIBS, and the influence of the KIBS context on the solutions process, at a time when the main proportion of KAM literature focuses on industrial companies (e.g. Hutt & Walker, 2006; Millman, 1996; Millman & Wilson, 1995, 1996; Workman et al., 2003). Apart from the KAM literature, the study also contributes to the solutions literature (e.g. Brax & Jonsson, 2009; Hakanen & Jaakkola, 2012; Jaakkola & Hakanen, 2013; Tuli et al., 2007; Windahl & Lakemond, 2006) by elucidating the central role of KAM teams in networked co-creation of integrated solutions. As managerial implications, the study provides advice for company management and for key account managers in particular, on organizing and managing KAM operations in co-creation of integrated solutions in business networks.

The study adopted a qualitative case study research approach. Data was collected by means of 30 in-depth interviews in nine supplier companies and three customer companies. The supplier companies operate in advertising, marketing and consulting, while the customer companies represent food industry and travel services. The article is organized as follows: firstly, presentation of the literature review and theory syntheses; secondly, reporting of the methodology and results; thirdly, presentation of the managerial implications, and finally, drawing of suggested theoretical contributions on the basis of the literature review and the empirical study.

2. Literature review and theory synthesis

2.1. Central characteristics of integrated solutions

Integrated solutions represent relatively broad and complex offerings (Nordin & Kowalkowski, 2010). Whereas products are about functionality, solutions are about outcomes that make life easier or better for the client (Miller, Hope, Eisenstat, Foote, & Galbraith, 2002) and about solving the customer's problems (Sawhney, 2006). Integrated solutions are defined as bundles of products and/or services that meet customer-specific needs and offer greater potential for value creation than the individual components would offer alone (e.g. Brady et al., 2005; Davies et al., 2007; Nordin & Kowalkowski, 2010; Tuli et al., 2007). This definition, and solutions literature in general, emphasizes answering customer-specific needs (e.g. Brady et al., 2005) by solving the customer's problems (e.g. Aarikka-Stenroos & Jaakkola, 2012; Davies et al., 2007; Sawhney, 2006; Skarp & Gadde, 2008) and by customizing the offering in accordance with the customer's needs (e.g. Miller et al., 2002). The bundle of products and/

or services is provided such that the solution components are integrated into a seamless solution (e.g. Brady et al., 2005; Brax & Jonsson, 2009; Davies, 2004; Hakanen & Jaakkola, 2012). Integration includes not only the technical integration of different solution components, but also organizational integration and cooperation between different business units (Davies, 2004; Davies et al., 2007; Storbacka, 2011; Tuli et al., 2007) and/or external suppliers (Hakanen & Jaakkola, 2012; Windahl & Lakemond, 2006). Finally, integrated solutions aim at offering greater potential for value creation than the individual components of the solution would offer alone (e.g. Brady et al., 2005; Brax & Jonsson, 2009; Jaakkola & Hakanen, 2013).

Solutions literature places strong emphasis on customer-centricity, long-term orientation in customer relationships, and the relational aspect of integrated solutions (e.g. Brax & Jonsson, 2009; Hakanen & Jaakkola, 2012; Tuli et al., 2007; Windahl & Lakemond, 2006). A significant proportion of solutions literature deals with the shift of industrial companies from being product-centric towards being service- or customer-centric (e.g. Kapletia & Probert, 2010; Matthyssens & Vandenbempt, 2008; Oliva & Kallenberg, 2003; Skarp & Gadde, 2008), and the capabilities needed during the course of that transition (Brady et al., 2005; Miller et al., 2002). Alongside the product-service bundle that continues to dominate the solutions domain (e.g. Davies et al., 2007; Kapletia & Probert, 2010; Matthyssens & Vandenbempt, 2008; Oliva & Kallenberg, 2003), a more relational and interactive view of solutions has emerged over the past few years. Rather than merely bundling product and service components, several studies emphasize a long-term, relational process with customers and/or other actors within a network (e.g. Brax & Jonsson, 2009; Hakanen & Jaakkola, 2012; Jaakkola & Hakanen, 2013; Tuli et al., 2007; Windahl & Lakemond, 2006). Furthermore, solutions research has expanded from studying product-based solutions to include solutions within the KIBS context (e.g. Jaakkola & Hakanen, 2013).

2.2. Knowledge-intensive business services (KIBS)

Over the past decades the significance of services within the economy has risen drastically (OECD, 2000), one of the growing business sectors being knowledge-intensive services. Knowledge-intensive business services (KIBS) are B2B services of which typical examples are IT services, R&D services, technical consultancy, legal, financial and management consultancy, and marketing communications (Toivonen, 2004, p. 31). These services rely heavily on professional knowledge, and are characterized by a high degree of problem-solving and interaction with the customer (Miles et al., 1995). By definition, KIBS are services involving economic activities which are intended to result in the creation, accumulation or dissemination of knowledge (Miles et al., 1995, p. 18). Knowledge and knowledge utilization are at the heart of knowledge-intensive services and regarded as a central means of gaining competitive advantage. As an extension of the intra-firm perspective, knowledge utilization is also recognized as a central competitive advantage in the inter-firm context, for companies operating in business networks (e.g. Dyer & Nobeoka, 2000; Lane & Lubatkin, 1998; Möller & Svahn, 2004; Tsai, 2001). When co-creating integrated solutions within KIBS, knowledge is the most essential of the resources integrated and applied in interaction among the actors involved. Hence, knowledge and knowledge management form one of the theoretical points of departure of this study.

Knowledge management is a process that deals with the development, storage, retrieval, and dissemination of information and expertise within an organization to support and improve its business performance (Gupta, Iyer, & Aronson, 2000). Although knowledge is widely regarded as something beneficial for business success and innovation, the concept of knowledge is complex, with multiple definitions, interpretations and connotations. Distinction between data (i.e. "raw" numbers and facts), information (i.e. processed data), and knowledge (i.e. authenticated information) is one commonly used categorization in knowledge management literature (Alavi & Leidner, 2001). Another

distinction is made between explicit and tacit knowledge (Polanyi, 1966). Alavi and Leidner (2001) outline several perspectives on knowledge viewed as a state of mind, an object, a process, a condition of having access to information, or a capability. This study approaches knowledge primarily from the process perspective, with the process of acquisition, assimilation, and application of knowledge falling particularly within its scope. Aspects of explicit and tacit knowledge are nonetheless both considered relevant; the study is not confined to any strict definition of knowledge, and recognizes and accepts its ambiguous nature.

2.3. Absorptive capacity of KAM teams

Previous research regards knowledge-sharing as promoting innovations and organizational learning (e.g. Lane & Lubatkin, 1998; Liao, Fei, & Chen, 2007). As an extension to the intra-firm perspective, knowledge-sharing is also recognized as a central competitive advantage in the inter-firm context, for companies operating in business networks (e.g. Berghman, Matthysens, & Vandenbempt, 2012; Dyer & Nobeoka, 2000; Inemek & Matthysens, 2013; Lane & Lubatkin, 1998; Möller & Svahn, 2004; Tsai, 2001). However, the extent to which companies are able to gain competitive advantage through knowledge utilization depends on the absorptive capacity – the ability to *acquire, assimilate, and apply* knowledge to commercial ends (Cohen & Levinthal, 1990; Lane & Lubatkin, 1998; Lane et al., 2001; Zahra & George, 2002). As Zahra and George (2002) summarize, acquisition refers to a company's capability to identify and acquire externally generated knowledge that is critical to its operations. Assimilation refers to the company's routines and processes that allow it to analyze, process, interpret and understand the information obtained from external sources. Application refers to how knowledge is used for commercial ends. From the perspective of an individual company, both inward-looking and outward-looking components of absorptive capacity are necessary for effective organizational learning (Cohen & Levinthal, 1990). An organization's absorptive capacity depends on the absorptive capacity of its individual members. Absorptive capacity is thus dependent not only on the communication between an organization and its external environment but on that among the sub-units of the organization (Cohen & Levinthal, 1990). Drawing on organizational learning theory, absorptive capacity is considered as a central capability in the work of KAM teams within knowledge-intensive business services that are based foremost on acquisition, assimilation, and application of knowledge from both internal and external sources.

2.4. Theory synthesis and identified research gaps within KAM literature

Key account management (KAM) is a commonly applied approach for relationship marketing in B2B markets. Research on KAM has evolved especially since the 90s, and has been studied from several perspectives: reasons for adopting KAM, selection of key accounts, elements of a KAM program, role and characteristics of key account managers, organizing for KAM, adaptation of KAM approaches, team selling, customer relationships, global account management, and success factors in KAM (Guesalaga & Johnston, 2010). A core selection criterion for strategically important key accounts is sales volume (McDonald et al., 1997), and key customers purchase large entities – also integrated solutions consisting of several product and/or service modules (cf. Brady et al., 2005; Davies et al., 2007). In line with the solutions literature, the KAM domain emphasizes long-term customer relationships, thorough understanding of customer needs, problem-solving and customizing solutions based on customer needs, and integration and coordination across organizational boundaries to create synergistic value for the customer (e.g. McDonald et al., 1997; Millman, 1996; Millman & Wilson, 1996; Ojasalo, 2001; Wilson & Millman, 2003; Workman et al., 2003). Despite the pivotal role of KAM teams in the

co-creation of integrated solutions, KAM literature lacks research that deals explicitly with integrated solutions.

Recapitulating the contexts in which empirical KAM research has been conducted, the majority of research is preoccupied with application of the KAM approach in industrial companies (e.g. Millman, 1996; Millman & Wilson, 1995, 1996; Workman et al., 2003) while research exclusively in the KIBS context remains scant (Nätti et al., 2006; Sharma, 2006). A quantitative study by Sharma (2006) concluded that investment in key accounts, satisfaction and personal bonds enhances successful key accounts (Sharma, 2006). The qualitative case study by Nätti et al., 2006 studied the effects of a KAM system implementation on the transfer of customer-specific knowledge between professionals, business functions and units. As the starting point of this study was the notion that there is a lack of research on how KAM teams co-create integrated solutions with their business customers within the KIBS context.

A substantial body of empirical KAM research includes both supplier and customer perspectives (e.g. Abratt & Kelly, 2002; McDonald et al., 1997; Millman, 1996; Millman & Wilson, 1995, 1996, 1999; Nätti et al., 2006). A few studies have also applied a network perspective to KAM research. For example, Ojasalo (2004) in his conceptual paper applied the phases of key account management (i.e. identification, selection, and implementation) in a network context. Another conceptual paper by Hutt and Walker (2006) applied social network theory to study of the performance of individual account managers in IT and the transport business. This resulted in emphasis on internal and external social networks because these are pivotal in the acquisition of rich customer and competitor knowledge.

The KAM team in this study integrates and applies resources through interaction to co-create value within a network consisting of KAM team members and customer representatives. Arguably, the key account manager occupies a focal position in the co-creation of integrated solutions by operating in a boundary-spanning role (Guenzi, Pardo, & Georges, 2007; McDonald et al., 1997; Nätti et al., 2006; Wilson & Millman, 2003) between the customer and supplier, striving for a fit between the customer's needs and the solutions offering of the supplier firm. The key account manager is responsible for conducting the "orchestra" of different actors (Hutt & Walker, 2006; McDonald et al., 1997; Millman, 1996; Nätti et al., 2006). In the co-creation of knowledge-intensive integrated solutions, the KAM team links the organization's internal network to external sources of information. The KAM team can thus be considered as a resource integrator, bounded by its absorptive capacity (Cohen & Levinthal, 1990; Lane & Lubatkin, 1998; Lane et al., 2001; Zahra & George, 2002). How KAM team members acquire, assimilate, and apply knowledge in a business network is thus a central question in applying a KAM approach within the KIBS context. There is a need, however, to create conceptual understanding and provide empirical insight concerning the phenomenon.

This study regards the solutions process, extending from sales and ideation to solution implementation, as a learning process in which knowledge is acquired, assimilated and applied among the network actors. To fill the identified research gaps in the KAM literature, the study builds on knowledge management and organizational learning theory. Analysis of the absorptive capacity of the KAM teams provides new insight into networked co-creation of integrated solutions and the influence of the KIBS context. Concurrently, new knowledge is created on the required KAM team activities – what should KAM teams do to enhance knowledge utilization with their customers? As a synthesis, a tentative framework was created to guide the study. It illustrates knowledge acquisition, assimilation, and application within a business network that can take place on three levels: a) among suppliers, b) in dyads between supplier and customer, and c) between KAM team and customer (Fig. 1). Here business network refers to the network of supplier companies – from which the professionals form the KAM teams – and customer companies.

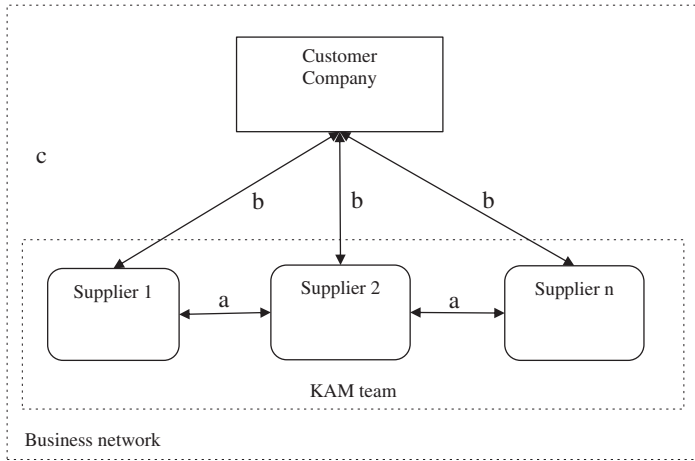


Fig. 1. Knowledge acquisition, assimilation, and application within a business network.

On the strength of all KAM team members participating in the co-creation of knowledge-intensive service solutions with key customers, the entire KAM team (including the key account manager) falls within the scope of this study. This study relies on the relational view of a firm (Dyer & Singh, 1998) because the focus is on B2B relationships. Instead of a product or a solution delivery from supplier to customer, in the spirit of Service-Dominant Logic (Lusch & Vargo, 2006), the customer participates in the solutions process. Integrated service solutions are therefore *co-created* by integrating resources among the actors within a business network.

3. Methodology

Selection of the qualitative case study approach was motivated by the aim to increase understanding of a complex phenomenon with multiple variables and processes (Yin, 2003). The case study approach is widely used by qualitative researchers in industrial marketing (Halinen & Törnroos, 2005; Piekari, Plakoyiannaki, & Welch, 2010), and is an appropriate strategy when “how” and “why” questions are being posed, when the investigator has little control over events, and when the focus is on a contemporary phenomenon in a real life context (Yin, 2003).

A business network consisting of nine supplier companies (“Suppliers 1–9”) and their three customer companies (“Customers 1–3”) was selected as a case for the purpose of examining the co-creation of integrated solutions as cooperation between supplier and customer firm representatives. The suppliers are part of a consolidated corporation (hereafter referred to as the “Group”) offering various marketing, advertising and consulting services to business customers representing leading brands in their fields. The Group has appointed key account managers for all its key customers, and many of its customer relationships – including those in this study – have lasted for decades. The KAM teams operate within the limits of (e.g. annual) skeletal agreements with the key customers in the study; several solutions are co-created within these agreements. The service offerings of several Group companies are used to develop an integrated solution based on the customer’s changing needs, with KAM teams composed accordingly. These teams might provide an integrated solution for a customer’s new product launch, for example, comprising package design and an advertising campaign on TV and in the print media. The solution often includes business consultancy. Knowledge has a central role in the KAM teams’ work. Ideation, creativity, and utilization of knowledge in the interest of enhancing the customer’s business are at the very heart

of marketing and advertising. The selected companies and informants are outlined in Table 1.

In-depth interviews (n = 30) were chosen as the main data collection method to provide rich empirical insight into the topic. Additional data were collected by attending and observing seven company workshops. The selected informants (Table 1) of the supplier companies were directly involved in KAM operations and/or were representatives of the company management, worked in close cooperation with customers, and had extensive knowledge and experience of the co-creation of integrated solutions. The customer representatives studied were the main contact persons for the respective KAM teams. The Group operates in the EU and participated in an extensive service research project that provided access to the companies. The study was conducted from November 2009 to October 2012.

Table 1
Outline of selected companies and informants.

Company (business field)	Informants	No. of informants
Supplier 1 (group administration)	Group CEO, business developer	2
Supplier 2 (marketing)	Three account executives, chief operating officer, business director, account director, marketing and digital service strategist	7
Supplier 3 (media planning)	Two senior client directors, client director, two client managers, planning director	6
Supplier 4 (CRM)	CEO/client director, art director	2
Supplier 5 (production)	CEO	1
Supplier 6 (media planning)	Client director	1
Supplier 7 (marketing)	Client director	1
Supplier 8 (business consultancy)	CEO	1
Supplier 9 (brand design)	Director	1
Customer 1 (food industry)	Marketing director, marketing manager, brand manager, two product group managers, product manager	6
Customer 2 (food industry)	Regional director	1
Customer 3 (travel services)	Company director	1
		n = 30

The purpose of data collection was to collect empirical evidence on the absorptive capacity of the KAM teams. Hence, collection was of the informants' perceptions of the solutions process and how, in the course of the process, knowledge is acquired, assimilated, and applied. The tentative framework (Fig. 1) served as a loose thematic frame for data collection and data analysis. The interviewees were asked to express their views openly on the integrated solutions they offer, and on their cooperation with other supplier companies and with customers. The interview questions addressed issues such as common history with key customers, how suppliers are organized to serve customers, how the solutions process with the customer starts, how the solution is co-created, and how solutions benefit the customer. The interviews were also used to gain customer views on solutions co-creation, thus complementing the views of the suppliers regarding KAM team activities. The interviews lasted from half an hour to an hour and a half, and were recorded and transcribed to improve the reliability of the research. Presenting the preliminary results of the study and checking the accuracy of the researchers' interpretations in the company workshops helped to improve the validity of the study (Yin, 2003).

The interview transcripts were reviewed and data categorized into three groups describing the kind of activities KAM teams undertake in knowledge acquisition, knowledge assimilation, and knowledge application. The data was then analyzed and reported in terms of the following questions: How do suppliers acquire externally generated information that is essential to their operations? How do suppliers analyze – and create common understanding of – the collected information? How do KAM teams support their customers' business and value creation by means of the acquired and assimilated knowledge? The data was also analyzed in terms of how business based on knowledge-intensive services was described by the informants: that is, the nature of the KIBS context (namely, marketing and advertising). Findings are reported together with data extracts to improve the reliability of the study (Silverman, 2006). Finally, conclusions were made on the basis of the literature review and the empirical study.

4. Results

This chapter reports the results of the case study. It shows how integrated service solutions are co-created in a business network in KIBS. More specifically, the results are reported with regard to how KAM teams acquire, assimilate, and apply knowledge in the course of the solutions process among the supplier companies, from which the KAM teams are formed, and with their customers. It provides both supplier and customer perceptions of, for example, the benefits and aims of the KAM approach, as well as the challenges and central issues faced, which affect knowledge utilization within a business network.

4.1. Knowledge acquisition

Negotiations concerning a new solution – such as a new product launch and advertising campaign – typically start with a briefing session presented by the customer. The purpose of the briefings is to identify and acquire the relevant information on customer needs on the basis of the solution. Sometimes customers have a clear idea of the kind of solution they prefer, including specifications, but quite often they do not. For KAM teams, acquiring this essential knowledge is a central task, as a customer representative states: *“Unfortunately, my team doesn't possess the competence required in purchasing these services ... but I think it's also part of the competence of the professional [of the supplier company] to dig out the necessary knowledge from the customer.”* (Customer 2). On the same lines, a supplier representative described how the solution is not always clear at the beginning of the solutions process: *“The customers trust us. So, instead of just coming to us for a ready solution, they tell us their specific challenges, target group and budget, and then trust in our ability to come up with a solution ... we spar the challenges together with the customer.”* (Supplier 6). In other

words, the solution is ideated and co-created together with the customer.

Beyond acquiring customer knowledge, it is important for KAM teams to gather broad information on marketing and advertising to gain awareness of business 'state-of-the-art', as described by a representative of Supplier 2: *“We observe the surrounding world, watch videos, read economic magazines, follow what happens in the advertising business, and what the competitors do ... to some extent we gather and share these in KAM teams but it's not in any systematic way.”* Nowadays, when KAM teams are composed of professionals from several supplier companies, leading coordination and knowledge exchange is occasionally challenging: *“The key account manager could always inform other companies better and earlier. This work is extremely hectic. I can easily receive a hundred mails a day, and the phone rings all the time. We're often very busy and that leads to insufficient communication.”* (Supplier 9). For example, web-based work spaces (e.g. extranets) are in use to ease the acquisition and exchange of knowledge within the Group. It became evident that knowledge is acquired through several sources and company relationships and shared through complicated processes among the network actors.

In applying the KAM approach, the Group attempted to coordinate the knowledge flows more effectively: *“It's all coordinated and everything centralized. They [the customer] don't need to make deals with six separate companies and go through everything six times over. It's all much more coherent. They don't have to manage or control anything. We do all that, and more quality and time and cost savings are accrued for the customer.”* (Supplier 2). Another supplier representative went on to describe the motives behind increasing knowledge exchange within the Group: *“Somebody has to see the big picture, to have the overall view. It can be really frustrating for the customer if different actors in the same Group are selling them different – or even competing – solutions. This simply shouldn't happen, so that's why somebody, somewhere, has to have the lead.”* (Supplier 9). Coordination, however, was not without its difficulties, as the following quote illustrates: *“Everyone wants to be in straight contact with customers [i.e. not via the key account manager]. We'd all like to 'own' the customer relationship ... Sometimes, even though we've agreed on coordination, somebody overtakes the key account manager. The feeling that someone is holding out on somebody always creates a certain amount of suspicion.”* (Supplier 1). It thus became evident in the interviews that several suppliers wanted to be in a central position concerning knowledge exchange with customers. As the number of suppliers increased, so did the challenges. The customers saw that while too few suppliers might limit the perspective, too many participants was also undesirable, as shown by the following quote: *“So you find when you get there that there are only one or two of us, but on their side there can be company reps from every related sub-sector imaginable... a huge number of people involved. So, of course, as a customer, with so many people around the table you start to wonder what this is all going to cost – not just in terms of money, but also the flow of information.”* (Customer 1). Balancing the richness of idea-sharing and creativity achieved through collaboration by multiple parties, on the one hand, and cost-effectiveness in knowledge exchange on the other, was a constant struggle for the KAM teams.

4.2. Knowledge assimilation

Taking place between customer and KAM team and among suppliers in the course of the solutions process, knowledge assimilation aims at creating understanding of knowledge by analyzing, processing, and interpreting it in the context in which it is used. The data indicated in a number of ways that KAM team members must understand the customer's business thoroughly before being able to solve the customer's problems. As an interviewee from Supplier 1 stated, the person attending the strategic sparring needs to have broad expertise and strategic know-how. A representative of Supplier 2 stressed that understanding builds up from getting close to the customer: *“Strategic sparring requires even more profound and deeper knowledge ... not only*

knowledge, but access and the opportunity to attend the forums in which these issues are discussed. This usually means the top management in the business world.” (Supplier 2). The “right” counterparts in the customer’s organization needed to be reached for knowledge assimilation to succeed.

Strategic know-how concerning a key customer develops over time. This was noticed by one of the customers (Customer 2): “I guess they must build up some sort of tacit knowledge. They also have long employment contracts, so something’s bound to accumulate over time.” In the main, suppliers considered customer knowledge as impossible to define explicitly. It was seen essentially to be derived from individuals learning to understand the customer over time, utilizing this understanding in their work, and sharing it with other KAM team members. Similarly, suppliers had omitted to define and describe part of their service offerings, something they viewed as a major challenge: “The challenge in our work is that we can’t concretize our competences so that customers grasp the value added. One of the biggest challenges is that we perform miracles but we’re unable to show how we do it ... the more creative and customized the direction you’re heading in, the more difficult it gets.” (Supplier 1). Furthermore, some services were “learnt by doing”, as the following quote demonstrates: “We’ve done it together with our customers, in the form of invented campaigns and other marketing actions. We haven’t been able to turn it into a product which we’d then offer. It’s all in the team’s heads so to speak, and then passed on as tacit knowledge.” (Supplier 4). These were challenges from the sales point of view, but also in terms of supplier cooperation, with one supplier not always able to understand what another supplier did. This hindered reaching a common view of the integrated solution.

The KAM teams also attempted an explicit description of customer knowledge and service offerings, describing some of their service concepts in the course of the research project. They also attended a workshop in which they analyzed key customers and their various characteristics – such as purchasing strategy and organization, and decision-making – as well as the competences of an individual purchaser. The teams compared different key accounts and made a joint interpretation of the customer knowledge acquired. The consequence was a common understanding of their key customers, with the process serving as a concrete example of knowledge assimilation in KAM teams.

The aim of the KAM approach was to provide the customer with a seamless solution and for the customer to see suppliers as a unified entity: “I think that for a customer the identity of the firm a particular KAM team member comes from is irrelevant. I think it’s very seamless ... We make sure that what we present to the customer is our common view. We can’t argue the best solution in front of a customer, of course, so we always make sure we’re singing the same tune before we start.” (Supplier 6). This was not always the case, however, and some customers accused suppliers of competing with each other. Interestingly, though, despite the desire of the customer for seamless integration and large entities, the idea is not fully supported by the customer’s own organization: “[I’d say] about our own organisation that it’s pretty fragmented, that we’re all calling for or expecting this incredibly clear-cut, total solution; yet at the same time, we ourselves have been pretty hugely decentralised, with all these brands and packaging designs and communications, so of course in that sense you can throw the ball back in our court.” (Customer 1).

4.3. Knowledge application

KAM teams apply knowledge in marketing and advertising to enhance their own and their customers’ business. The teams support their customer’s business and value creation by applying knowledge in a number of ways. They provide concrete end-results, including print or TV advertisements, or market studies. Another example of KAM team support was in providing a view from the outside. As one supplier commented: “Our strength is that we’re not in as deep as the customers are when it comes to daily operations, with it being their own business, but we can view these from a ‘helicopter perspective’, to provide

a neutral, outsider view.” (Supplier 2). Some customers even wanted to be ‘challenged’ by outsiders, but suppliers realized they had to tread carefully: “You can’t ‘teach’ the customer, you have to be very diplomatic in questioning the customer’s views, in challenging the customer a little bit ... but it’s for their own good if we do challenge them, as we’re all aiming for the best end-result.” (Supplier 2). Customers also wanted KAM teams to bring energy and enthusiasm to their business development. The work of the KAM teams was thus not only about applying knowledge but also increasing the opportunities for fruitful co-creation among the actors.

A salient role of KAM teams was to provide their customers with knowledge on new kinds of business opportunities. A director of Customer 3, for example, thanked the KAM team as follows: “Now we know of these various possibilities, we know something we didn’t realize or understand before – the direction in which this world is going.” Customers particularly sought new knowledge on digitalization of marketing and advertising, on how they could utilize it more successfully. This was an example of a topic that required thorough knowledge acquisition, assimilation, and application from the KAM teams: “There are tremendous possibilities in that world. We should seek ways of creating value for our customers. This involves active searching, researching, and thinking, and we’re not doing it by ourselves but using all sorts of professionals.” (Supplier 5).

5. Managerial implications

Managerially, this study provides new knowledge on how to apply the KAM approach successfully in KIBS when complex service offerings are co-created among several supplier companies and their common customers. On the basis of this case study, the company management, and especially key account managers, is advised to address the important role of knowledge in managing the work of KAM teams. Sufficient resources and tools, as well as the promotion of an atmosphere of knowledge sharing, are pivotal. This study encourages development of the absorptive capacity of KAM teams, i.e. their ability to acquire, assimilate and utilize knowledge in a business network. On a more concrete level, practitioners in companies could, for example, map the solutions process in which utilized knowledge from various actors, and the phases of acquisition, assimilation and application, is defined. As a result, the critical points, which require the most attention, could be identified and the necessary development activities defined. Table 2 outlines the central KAM team activities identified in this study.

This study presents several managerial implications with regard to managing KAM operations. Some companies organize their operations so that separate business units are responsible for sales (i.e. the KAM unit) and service delivery. However, this study implies that the central role of tacit knowledge in marketing and advertising might have encouraged the companies to organize KAM operations so that the whole solutions process from sales to implementation is the KAM teams’ responsibility. Separate units in selling and service provision may hinder the knowledge assimilation and application required in the co-creation of customized service solutions. In the case of KAM teams being composed of several suppliers, knowledge sharing may be especially challenging if there is any degree of competition between the suppliers. This point should be taken into account in forming KAM teams and selecting partners in business networks. It is then pivotal to agree on the task division between the suppliers, i.e. who is responsible for coordinating knowledge flows between the suppliers and the key customer.

As this study has pinpointed, a KAM team is not merely about integrating various service “modules” and delivering them to the customer, but the co-creation aspect of service rather motivates KAM teams to focus on organizational integration and facilitating cooperation between all the network actors. Then, the way the various organizational cultures should be integrated into solutions co-creation becomes a salient question. For example, companies may prefer different levels of openness

Table 2
Central KAM team activities in co-creation of integrated solutions in KIBS.

KAM team activities
Knowledge acquisition
<ul style="list-style-type: none"> Identify the business customer's problem, needs, and value expectations Become acquainted with the service offerings of suppliers within the KAM team Analyze the customer's preference for centralized or de-centralized knowledge flows Define knowledge flows and contact persons for effective coordination Utilize tools (e.g. IT tools) to integrate the network actors and knowledge flows
Knowledge assimilation
<ul style="list-style-type: none"> Share knowledge of the customer's problem, needs, and value expectations in the KAM team Make customer knowledge explicit among suppliers where possible Analyze and interpret customer knowledge to customize the solution to customer needs Create common understanding of the contents of the solution within the business network
Knowledge application
<ul style="list-style-type: none"> Enhance the customer's business through offering concrete solutions and strategic insight for the customer's business development Provide the outsider view and challenge the customer Promote the spirit of common ideation and co-creation among actors Present the KAM team as a unified front at the customer interface Provide expected value for the customer through solutions co-creation

in knowledge sharing. In KIBS, where sharing confidential knowledge is often necessary, balancing between openness and avoiding the risk of leaking own core competence to other companies is a constant challenge. This point also reminds practitioners to select the partners within a business network carefully and to plan ways to protect their own business core.

Based on this study, successful assimilation of tacit knowledge within KAM teams is a central prerequisite for a KAM team to be able to present itself as a unified front in the customer interface. In some cases, tacit knowledge can be presented in explicit form, but most important is the need for close interaction among KAM team members in order to create common understanding of business customers and the services that separate supplier companies offer. Assimilation and accumulation of important tacit knowledge require time, long-term orientation in business relationships and trust between the KAM team members and with the customer representatives. Consequently, this study suggests that companies pay attention to the stability of the KAM team. Constantly changing professionals in the KAM team may cause significant difficulties in applying the KAM approach and co-creating integrated service solutions successfully in KIBS.

6. Conclusions

6.1. Discussion and theoretical contributions

The motivation for the study derives from a need that is both practical and theoretical: the need to increase knowledge of how KAM teams might ensure more successful value co-creation with their business customers in the service sector. The study provided rich empirical insight into how KAM teams, operating in marketing and advertising, co-create integrated solutions with their business customers. The KAM approach enables the covering of customers' extensive needs through the bundling of various marketing, advertising and consulting services, and the provision for customers of a "one-stop shop" principle for purchasing integrated solutions. This approach ensures coherent marketing communications despite the number of products and marketing channels in use, serves as a means of centralizing complex knowledge flows, and eases "orchestration" of the network of actors. KAM teams integrate and apply resources through interaction to

co-create value within the business network (cf. Ballantyne & Varey, 2006; Baraldi et al., 2012; Cova & Salle, 2008; Gummeson & Mele, 2010; Jaakkola & Hakanen, 2013; Lusch & Vargo, 2006).

Within the KIBS context, the KAM team can be regarded as a knowledge integrator, with knowledge integration taking place on three levels: among the suppliers within KAM teams, in dyads between supplier and customer, and between KAM team and customer. KAM teams integrate knowledge along the solutions process, from sales and ideation to the implementation of the solution. The work of KAM teams begins with knowledge acquisition for the purpose of integrating the knowledge emanating from various internal and external sources. The knowledge acquired is versatile, concerning customers, marketing and advertising business in general, and the offerings of the suppliers. The teams analyze and interpret information among suppliers within the KAM teams and between the KAM teams and customers. They then integrate the various views regarding customers and customers' problems and needs, and ideate possible solutions to the customers' problems. Knowledge assimilation leads to a mutual understanding of customer needs and the customized solution within the KAM team and with the customers. The resulting application of acquired and assimilated knowledge in solutions implementation enhances the business of both suppliers and customers.

When knowledge utilization was analyzed, KAM teams balance between centralization and decentralization of knowledge flows in conducting the boundary spanning role (Guenzi et al., 2007; McDonald et al., 1997; Nätti et al., 2006; Wilson & Millman, 2003) between suppliers and customers. Although centralization is often the business customer's wish, the customer's own organization may not support centralized knowledge flows, and may instead be dispersed. KAM teams also balance between cost-effectiveness and innovativeness – fewer participants in KAM teams may accrue for an effective solutions process, but more participants enable richer ideation and discovery of new, possibly creative knowledge combinations. In addition to customer knowledge – addressed in prior KAM literature (Hutt & Walker, 2006; Nätti et al., 2006) – this study also recognizes the importance of acquiring and assimilating knowledge concerning the common service offering within a KAM team. Thus, when striving to achieve the fit between customer needs and solutions offering, KAM teams integrate external knowledge (i.e. customer knowledge) and internal knowledge (concerning the offering). As integrated solutions had not previously been studied explicitly within the KAM domain, and the network perspective had only been discussed conceptually (e.g. Hutt & Walker, 2006; Ojasalo, 2004), this study contributes to the KAM literature by providing conceptual understanding and empirical insight with regard to networked co-creation of integrated solutions, including both supplier and customer perspectives.

The motivation behind building the study on knowledge management and organizational learning theory was the central role of knowledge and learning within knowledge-intensive business services (KIBS). Analysis focused on the KAM teams' absorptive capacity (Cohen & Levinthal, 1990; Lane & Lubatkin, 1998; Lane et al., 2001; Zahra & George, 2002) – that is, how KAM teams acquire, assimilate, and apply knowledge in the solutions process. Both suppliers' and customers' businesses are enhanced through knowledge application and learning within a business network (cf. Berghman et al., 2012; Inemek & Matthyssens, 2013; Lane & Lubatkin, 1998; Möller & Svahn, 2004; Tsai, 2001). Customers seek an outside view and creative ideas, and learn about markets and new business possibilities. On the other hand, learning is a source of motivation for KAM team members.

When studying KAM teams' knowledge utilization, it was discovered that absorptive capacity was closely related to all the central characteristics of integrated solutions within KIBS: thorough understanding of a customer's business and needs, problem-solving and ideation, customization, and the bundling of various services into seamless solutions that create more value than the parts alone. This study therefore proposes that, within KIBS, the entire solutions process – from sales and ideation

to implementation of the solution – builds upon knowledge acquisition, assimilation, and application. As a consequence, this study contributes to the KAM literature by elucidating the central role of knowledge utilization in the co-creation of integrated solutions in KIBS at a time when the main proportion of KAM literature focuses on industrial companies (e.g. Hutt & Walker, 2006; Millman, 1996; Millman & Wilson, 1995, 1996; Workman et al., 2003).

Furthermore, when analyzing the influence of the KIBS context on co-creation of integrated solutions, and the kind of knowledge (explicit/tacit) utilized in solutions co-creation, the role of tacit knowledge in service offerings rose above explicit. Some marketing and advertising solutions are in explicit form, such as an advertisement in a magazine or a market survey report. However, marketing or advertising solutions always include planning and ideation, and often (at least to some extent) business consultancy – these are all highly based on tacit knowledge. In addition to the solution to their problems, customers may even seek a certain kind of “atmosphere” to enhance co-creation in their business development, such as “energy and enthusiasm”, something rather impossible to describe explicitly in service offerings. Tacit knowledge was regarded as a strength in supporting the customer’s business, but also caused challenges, especially to knowledge assimilation within KAM teams. The conflicting views of customers and the contents of a particular solution could result in incoherent customer experience, and place in jeopardy the main idea of integrated solutions – that of being seamlessly integrated. In this case, ambiguity of tacit knowledge acquired, assimilated, and applied within the KIBS context may actually hinder cooperation and the co-creation of integrated solutions. The study’s contribution to the KAM literature here is in elucidating the central role of tacit knowledge and the related challenges in marketing and advertising. These findings complement the previous industry-oriented KAM literature (e.g. Hutt & Walker, 2006; Millman, 1996; Millman & Wilson, 1995, 1996; Workman et al., 2003) in which studies concentrating exclusively on KIBS are in a noticeable minority (Nähti et al., 2006; Sharma, 2006). To enhance the absorptive capacity of KAM teams in utilizing tacit knowledge, this study suggests they attempt to convert tacit customer knowledge and knowledge regarding service offerings into explicit form wherever possible. Resources must also be allocated for providing sufficient routines and processes to allow KAM teams to analyze, interpret, and gain mutual understanding of such tacit knowledge.

Finally, this study contributes to the solutions literature and, in particular, complements the relational and interactive view of solutions (e.g. Brax & Jonsson, 2009; Hakanen & Jaakkola, 2012; Jaakkola & Hakanen, 2013; Tuli et al., 2007; Windahl & Lakemond, 2006) by elucidating the role of KAM teams and by studying knowledge acquisition, assimilation, and application in networked co-creation of integrated solutions.

6.2. Limitations and suggestions for future research

As with all research, this study has its limitations, which may also offer interesting future research avenues. The main limitation of the study concerns the generalizability of the results. Since statistical generalization is not the purpose of qualitative research (Yin, 2003), this study aims at analytical generalizability. To improve the external validity of the study, the findings could be replicated in various contexts. Furthermore, as the study was conducted within the KIBS context, the results are more likely to be applicable in similar business fields. There are undoubtedly major differences among different business fields within KIBS; for example, the role of tacit knowledge may not be as central in business fields, such as ICT or legal and financial consultancy, as it is in marketing and advertising. More research could be conducted in various business fields, for example to assess the role of knowledge and importance of absorptive capacity in KAM teams’ work in various businesses.

This study opened up the discussion, but gave only a rather narrow view concerning complex offerings – namely integrated solutions – by studying these from the point of view of knowledge utilization. Undoubtedly, there are several other capabilities in addition to absorptive capacity that are central in co-creating integrated solutions. More research is thus called for in studying integrated solutions from various perspectives within the KAM domain. For example, in addition to absorptive capacity, which other capabilities and management practices could enhance the co-creation of integrated solutions?

The ambiguity of knowledge as a concept represents another limitation of this study. For example, strategic insight and other forms of tacit knowledge that the informants emphasized in this study are rather problematic to grasp and analyze rigorously. Utilization of tacit knowledge was nevertheless regarded as a central characteristic of the marketing and advertising business, and undoubtedly has its effects on business and customer relationships. Although some means of sharing tacit knowledge and making it explicit were recognized in this study, research could go on and provide concrete tools for KAM teams for enhancing knowledge assimilation and application with regard to tacit knowledge.

Another limitation derives from the fact that the KAM teams in this study were responsible for the entire solutions process, from sales to the implementation of the solution with customers. However, this is not always the case in companies, where separate organization units are responsible for sales (i.e. the KAM unit) and implementation. It may be that only limited insight is offered by the study findings on knowledge utilization for this particular application of the KAM approach. However, the phases of knowledge acquisition, assimilation, and application can be applied in any unit of the organization, being especially relevant when operating in KIBS and where knowledge plays a salient role in business. Knowledge utilization as an interplay between customers, KAM unit and service providers could thus provide another interesting topic for future research.

This study contributes to the KAM literature through bringing insight into knowledge-intensive business services (KIBS). Despite the rise of services within the economy, KAM literature remains largely industry- and product-oriented. This study therefore calls for more research on applying the KAM approach to service sectors and to industrial companies where the role of services is increasing within formerly product-oriented offerings. Study could then be made of the KAM teams’ role in servitization (cf. Baines, Lightfoot, Benedettini, & Kay, 2009; Matthysens & Vandembemt, 2008; Oliva & Kallenberg, 2003; Vandermerwe & Rada, 1988). KAM teams undoubtedly possess the necessary strategic insight on customers required in servitization, and occupy a central role in bundling products and services. All in all, KAM research could apply more approaches based on Service Dominant Logic (Lusch & Vargo, 2006) to the work of KAM teams in various businesses. Finally, because this study has provided conceptual understanding and empirical insight into the role of KAM teams in the co-creation of integrated solutions, study of the research topics suggested above could continue under quantitative research.

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Title	Co-creation of integrated service solutions in business networks
Author(s)	Taru Hakanen
Abstract	<p>Operating in business networks and increasing service- and knowledge-intensiveness of solutions offerings are prevalent phenomena in the business world. While studies on product-service bundles and servitization of industrial companies are abundant in solutions literature, integration of services and the related capabilities at business network level have attracted sparse attention.</p> <p>This doctoral thesis aims to increase understanding of companies co-creating integrated service solutions in business networks. The research employs a qualitative case study approach based on 101 in-depth interviews in 13 supplier companies and 17 customer companies. Industrial services and knowledge-intensive business services (KIBS) in marketing, advertising and consulting fall within the scope of this research.</p> <p>Drawing on the in-depth empirical evidence and selected theoretical perspectives of value creation, service management, knowledge management and key account management, this thesis extends and complements prior research on integrated solutions. The novelty value of this research is derived from the application of new theoretical perspectives to the study of integrated solutions and the identification of the corresponding central capabilities and activities.</p> <p>As a result, the identified organizational and knowledge integration capabilities complement the previously depicted core capability of systems integration with a relational and interactive co-creation aspect of integrating services in a business network. Activities such as agreeing on network positions and sharing knowledge between network actors are then pivotal to ensuring successful value co-creation and a seamless customer experience. Consequently, this thesis enhances the shift of mindset in solution business from goods-oriented thinking towards strong customer focus and a relational and collaborative nature of value co-creation. In addition to contributing theoretically, this thesis provides managerial advice in terms of the central activities in co-creating integrated service solutions within a group of suppliers and their common business customer.</p>
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Nimeke	Integroitujen palveluratkaisujen yhteisluonti liiketoimintaverkostoissa
Tekijä(t)	Taru Hakanen
Tiivistelmä	<p>Tämä väitöskirja yhdistää kaksi yleistä yritysmaailman ilmiötä: yritysten toimimisen osana liiketoimintaverkostoja sekä palvelu- ja tietointensiivisyyden lisääntymisen ratkaisuliiketoiminnassa. Tämänhetkinen integroituja ratkaisuja koskeva kirjallisuus keskittyy vahvasti tuote-palveluratkaisuihin ja teollisten yritysten "palvelullistumiseen" (engl. servitization). Sen sijaan kirjallisuudessa on hyvin vähän palvelujen integrointiin liittyvää tutkimusta, eikä ole tutkimustietoa siitä, millaisia kyvykkyksiä palveluratkaisujen yhteisluonti edellyttää yrityksiltä.</p> <p>Tämän väitöskirjan teoriapohja rakentuu arvonaluonnin, palvelujohtamisen, tietojohtamisen ja avainasiakkuuksien johtamisen kirjallisuuksien varaan. Tutkimuksen uutuusarvo perustuu uudenlaisten teoreettisten lähestymistapojen hyödyntämiseen integroitujen ratkaisujen tutkimuksessa sekä siihen, että tunnistetaan palveluratkaisujen verkostomaiseen yhteisluontiin tarvittavat aktiviteetit ja kyvykkyudet.</p> <p>Tutkimus toteutettiin laadullisen tapaustutkimuksen lähestymistavalla hyödyntäen aineistona haastatteluja (n=101), jotka toteutettiin 13 toimittaja- ja 17 asiakasyrityksessä. Lisäksi aineistoa kerättiin yritystilaisuuksissa. Tutkimuksen kohteina olivat sekä teollisuuden palvelut että tietointensiiviset mainonnan, markkinoinnin ja konsultoinnin palvelut.</p> <p>Tutkimuksen tuloksena tunnistetut organisatorisen integroinnin ja tiedon integroinnin kyvykkyudet täydentävät aiemmin ratkaisuliiketoiminnassa keskeisenä pidettyä systeemi-integraatiokyvykkyyttä. Tulokset korostavat yritysten välisiä suhteita, vuorovaikutusta ja yhteisluontia palvelujen integroinnissa. Tällöin esimerkiksi verkostoasemasta sopimiseen ja tiedon jakamiseen liittyvät aktiviteetit ovat keskeisiä onnistuneen arvonaluonnin ja saumattoman asiakaskokemuksen varmistamisessa. Samalla tämä väitöskirja edistää ratkaisuliiketoiminnan siirtymää tuotelähtöisestä ajattelumallista kohti asiakaskeskeistä ratkaisuliiketoimintaa ja yritysten välisenä yhteistyönä tapahtuvaa arvonaluontia. Lopuksi väitöskirja tarjoaa käytännön suosituksia yritysjohdolle siitä, miten liiketoimintaverkostoissa yhteisluodaan palvelu- ja tietointensiivisiä integroituja ratkaisuja.</p>
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Co-creation of integrated service solutions in business networks

Operating in business networks and increasing service- and knowledge-intensiveness of solutions offerings are prevalent phenomena in the business world. Prior literature on integrated solutions predominantly concentrates on studies conducted in manufacturing companies and the capital goods industry. However, integration of services and the related capabilities at business network level have attracted sparse attention. Drawing on the in-depth empirical evidence and selected theoretical perspectives of value creation, service management, knowledge management and key account management, this thesis extends and complements prior research on integrated solutions. It identifies organizational and knowledge integration capabilities as the central capabilities in the co-creation of integrated service solutions in business networks. Activities such as agreeing on network positions and sharing knowledge between network actors are then pivotal to ensuring successful value co-creation and a seamless customer experience. Consequently, this thesis enhances the shift of mindset in solution business from goods-oriented thinking towards strong customer focus and a relational and collaborative nature of value co-creation.

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