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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.



## 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 & Vandenbempt, 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

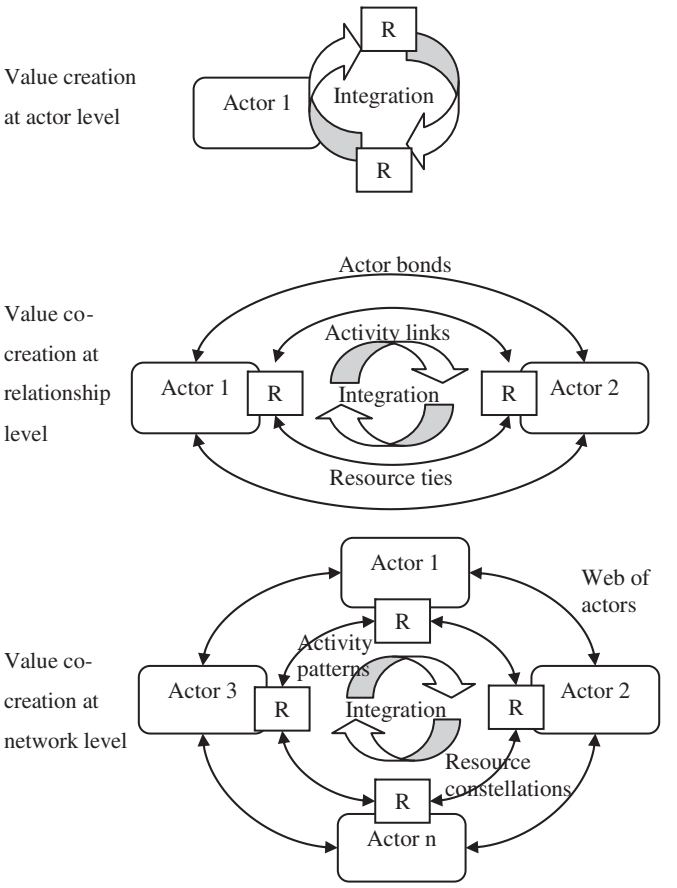


**Fig. 1.** Value co-creation at actor, relationship and network levels ('R' denotes resources).

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

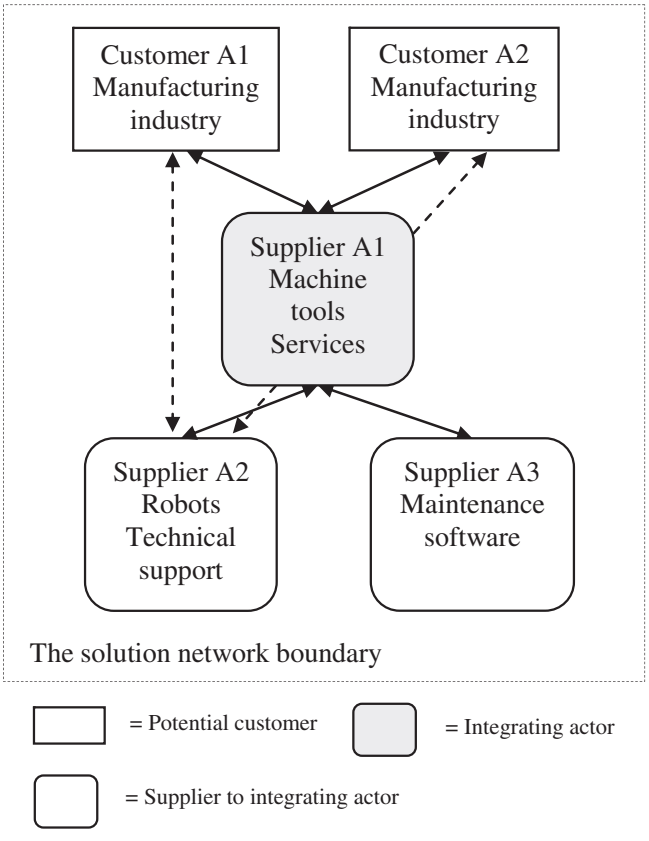


**Fig. 2.** Illustration of the Industrial Solution Network.

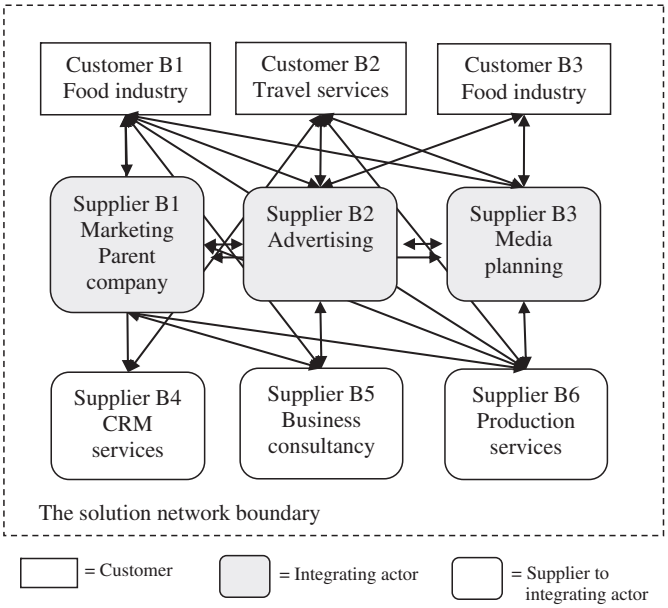


**Fig. 3.** Illustration of the Marketing Solution Network.

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 (Håkansson 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 | • The central supplier and customer firms involved in the development and delivery of the integrated solution<br>• Clearly defined and stable network positions<br>• Strong personal bonds among only some actors | • The central supplier and customer firms concerning the development and delivery of the integrated solution<br>• Dynamic network positions and effort to improve one's position<br>• Strong personal bonds between actors in all supplier and customer organizations<br>• High importance of personal relationships and 'chemistry' between people |
| Resources | • Operand resources (products) augmented with operant resources (services)<br>• Solution comprising rather standardized components<br>• A clear and predefined resource constellation<br>• Customer resources utilized especially in selecting technology options to fit the solution to the customer's manufacturing process | • Operant resources: knowledge, expertise, skills, information<br>• Highly customized solution<br>• Differing resource constellations because of the creative process and varying customer needs<br>• Customer resources pivotal in every phase of the solutions process |
| Activities | • More or less transaction based relationships<br>• Systematic activities and mapped processes<br>• Straightforward integration because of clear division of solution components<br>• One company responsible for coordination and the customer interface | • Administrative and technical links due to part joint ownership<br>• Complex pattern of activities in solution development<br>• Flexible processes<br>• Resource integration through rich ideation, problem solving, interaction and mutual adaptation<br>• 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 | • Support for strategy i.e. growth of service business through complementary resources<br>• Differentiation from competitors<br>• Managing seasonal risk through life-cycle services and long-term customer relationships | • Sales and marketing activities<br>• Investing in training sales and maintenance personnel<br>• Effort in integrating technology and services<br>• Risk of the partner operating at the customer interface under their brand |
| Supplier A2, supplier to integrating actor | • Increase in robot sales<br>• Gaining access to a new market<br>Input to R&D from another customer segment | • Risk of wasted R&D through the limited potential to affect sales aims and activities<br>• Risk of not getting enough input to own R&D via partners' personnel |
| Supplier A3, supplier to integrating actor | • Gaining access to a new market<br>• Input to R&D from another customer segment<br>• Learning about a new customer segment<br>• Extending own service offering | • Large upfront investment in R&D but profits generated much later |
| Customer A1 and A2 | • Easy to buy with one-door principle<br>• Less coordination work<br>• Efficiency of manufacturing process and support in investment planning<br>• Concentration on core business | • Integrated solution is a significant investment for an SME<br>• 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 | • Enhancing the group's business by developing a full service offering involving multiple actors | • Sales and customer relationship management activities<br>• Coordinating the common development work |
| Supplier B2 and B3, integrating actors | • Profitable business through being 'close to the customer'<br>• Access to partners' complementary resources<br>• Flexibility of resource allocation | • Overlapping goals between the suppliers<br>• Coordination work<br>• Own reputation is affected by partners' performance at the customer interface<br>• Dependence on partners' resources impacts own agility and service development<br>• Commitment to a specific network may limit partnering with others |
| Suppliers B4–B6, suppliers to integrating actors | • Credibility from being a part of a known network<br>• Less or no sales activities<br>• Access to bigger customers that can be used as references | • Lack of trust in each other's competences<br>• Limited potential to affect timetables or content of the solution<br>• Professionals' reluctance to act as mere resource providers |
| Customers B1–-B3 | • Ease of buying<br>• Less coordination work<br>• Better results through seamlessly integrated marketing communications<br>• Concentration on core business | • Incoherent service experience from the service suppliers<br>• Supplier's own interests and resources may define the solution instead of customer needs<br>• Lack of control over service suppliers<br>• 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 & Vandenbempt, 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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