

# Master Thesis

## *How can manufacturing firms better make use of role dynamics in co-created servitized solutions?*

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### **ABSTRACT**

Manufacturing firms increasingly follow the prevalent trend of servitization as they move away from delivering stand-alone products towards offering customized solutions. Thereby, they seek to actively integrate their customers in the solution process in order to facilitate an enhanced solution development. During this joint solution process, interactions facilitated through services enable firms to engage in the customers' value creation process. As this implies a transition towards the joint value creation sphere, where firms can now co-create value *with* customers, new roles emerge which have been widely unexplored in recent servitization, value creation and role theory literature. Knowing and managing the different role dynamics that are inherently linked to a servitized solution- and value creation process is therefore utterly important for firms to create additional value. The present study employs a qualitative multiple case design to advance the understanding in this topic of interest. An inductive analysis provides valuable insights from servitized manufacturers operating within different industry contexts. This study contributes to the mentioned literature as it provides a managerial framework depicting firm strategies on how to better cope with role dynamics in co-created servitized solutions. Furthermore, it advances and extends existing yet rare literature on firm roles in value co-creation processes as it identifies six roles firms adopt in practice.

### **Keywords**

Servitization, solution process, customer solutions, value (co-) creation, role theory, role dynamics

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## 1. INTRODUCTION

As a response to highly competitive markets and changing customer needs, many manufacturing firms seek to offer product-service combinations or solutions that provide greater value to the customer than the individual components would provide alone (Jaakkola & Hakenen, 2013; Rönnerberg Sjödin et al., 2016; Tuli et al., 2007). This transformational change process is described as servitization of business (Vandermerwe & Rada, 1988; Baines et al., 2009). It implies a shift in the mindset of manufacturing firms, namely away from the goods-dominant (G-D) logic, where value is created through economic exchange *for* the customer, towards a service-dominant (S-D) logic, where value is co-created in interactive relationships *with* the customer (Moeller et al., 2013; Grönroos & Voima, 2013; Aarikka-Stenroos & Jaakkola, 2012). Consequently, extensive interactions between firms and customers are prominent and utterly important during solution processes to co-create value (Aarikka-Stenroos & Jaakkola, 2012). Recent literature underlines the importance of these interactions for firms as they afford them opportunities to assert influence on the value perception of the customer (Grönroos, 2008; Payne, 2008). More specifically, value emerges when firms and customers exchange, integrate and apply knowledge, resources and skills in interaction (Grönroos & Voima, 2013; Vargo & Lusch, 2011). Although many marketing scholars underline the relevance of value (co-) creation in business engagements - even consider it as central means for firms to generate competitive advantages, research on value co-creation activities and interactions between actors is very scarce (Rönnerberg Sjödin et al., 2016; Lenka et al., 2017; Aarikka-Stenroos & Jaakkola, 2012).

With the provision of product-service combinations, both the firms and the customers perform different roles at different points when they co-create solutions (Agrarwal & Rahman, 2015; Aarikka-Stenroos & Jaakkola, 2012; Bitner et al., 1997; Rönnerberg Sjödin et al., 2017). However, many manufacturing firms struggle with successfully dealing with these role dynamics in interactions (Rönnerberg Sjödin et al., 2017; Grönroos & Voima, 2013). In general, roles reflect characteristic patterns in human behaviour (Biddle, 1986; Moeller et al., 2013), are usually associated with socially construed expectations of actions and behaviours (Rönnerberg Sjödin et al., 2016) and should complement each other to facilitate positive value co-creation (Grönroos & Voima, 2013). Yet, a given role can be iterative and vary within different structures and in different contexts, which complicates both the predictability of the behaviours and the responsive actions (Aarikka-Stenroos & Jaakkola, 2012; Tuli et al., 2007; Petri & Jacob, 2016; Biggemann et al., 2016). Therefore, knowing the (type of) behaviour another customer is likely to exhibit simplifies future interactions and enables a better and more efficient management of collaborative activities, through which value can emerge (Stiles, 1985; Moeller et al. 2013; Rönnerberg Sjödin et al., 2016). In contrast to this, a mismanagement of the role dynamics can result in value destruction (Carlborg et al., 2018; Grönroos, 2008).

Since prior literature offers only scarce elaborations on the value creation roles in co-created servitized solutions in the context of business-to-business (B2B) markets, (Lenka et al., 2017; Aarikka-Stenroos & Jaakkola, 2012; Petri & Jacob, 2016), there is a need to advance the understanding on this specific topic of interest (Grönroos & Voima, 2013; Moeller et al., 2013). Therefore, this paper addresses this lack of theoretical insights and empirical results. In this process, the paper focuses on the firm perspective in value co-creation. Thus, the guiding research question throughout this paper is: *“How can providing firms better make use of role*

*dynamics in co-created servitized offerings?”* To answer this question, two sub questions lead the path in doing so:

1. *What are the collaborative activities in the co-creation of servitized solutions?*
2. *What are the roles firms adopt to positively influence the co-creation of value?*

This paper presents a managerial framework on how firms can better make use of role dynamics in servitized solutions. Thereby, the framework underlies an advanced and extended understanding on the roles that firms adopt during the solution process. By elaborating on this, a multiple case study is employed to identify comparable or differing patterns across the cases. The qualitative abductive study involves four servitizing German, Dutch and Finnish SMEs in which data has been collected by means of in-depth interviews. Hereby, this research contributes to servitization, solutions and value creation literature as it advances the role understanding for firms in the development of solutions. From a practical standpoint, the current study proposes five strategies which can be used by manufacturing firms to better coordinate and influence the joint solution and the value co-creation process.

The remainder of this paper is structured as follows: a literature review showcases the different findings on servitized solutions, value co-creation, and the roles that are adopted. Following this section, an explanation of the chosen methodology is portrayed. The section thereafter presents the findings of the data analysis. Later, a discussion section synthesizes the important findings of the study. In the end, a conclusion is drawn which answers the research questions.

## **2. LITERATURE REVIEW**

### **2.1. Servitized Solutions**

Solutions received increasing attention in service, marketing and business operations research due to increasing customer demands and requirements in business-to-business markets. As they have been defined as combinations of good and service components to meet customer's business needs (Petri & Jacob, 2016; Tuli et al., 2007), manufacturing firms transition to offer solutions instead of stand-alone goods to gain competitive advantages through differentiation and to provide value for the customer (Nordin & Kowalkowski, 2010; Lenka et al., 2017; Tuli et al., 2007; Biggemann et al., 2013; Ballantyne & Varey, 2008). This transformational change process of manufacturers who move away from a product-centric towards a service-centric business model is commonly denoted as servitization (Rabetino et al., 2018; Vandermerwe & Rada, 1988; Baines et al., 2009). Owing to the difficulties to maintain competitive advantages and customers' increased demand for customized and advanced offerings, servitization helps to overcome these challenges, suggesting firms to include customers in the development of solutions (Gebauer, Gustafsson & Witell, 2011; Hakanen et al., 2017, Baines et al., 2009). This is in line with the findings by Vandermerwe and Rada (1988), who attribute the customer a central role in any co-creation endeavor. Thus, the term 'servitized solutions' implies joint activities and close collaborations between firms and customers in which resources, knowledge and skills are exchanged during a solution development process. Therein, services serve as interaction-enabling platforms.

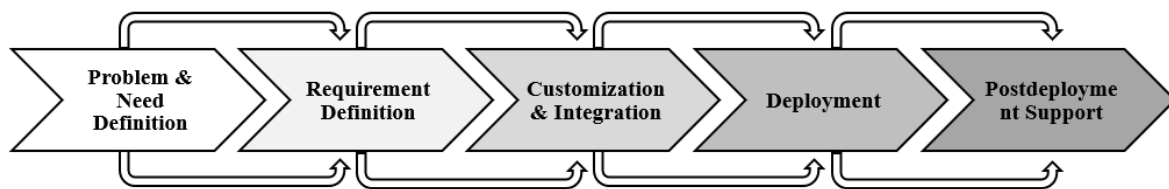
To provide customer solutions, firms must establish intimate relationships with their customers to be able to facilitate effective co-creation (Malshe & Friend, 2018; Biggemann et al., 2013; Tuli et al., 2007). This has been underlined by Tuli et al. (2007), who emphasized that firms should view customer solutions as longitudinal, relational processes. They argue that the adoption of this perspective is more effective in the long-term than extant product-centric perspectives on customer solutions as this enables firms to connect more closely with their customers, which found support by Aarikka-Stenroos and Jaakkola (2012), Rabetino et al. (2016) and Ulaga and Reinartz (2011). This resonates with the customer intimacy concept by Treacy and Wieresma (1993), suggesting that customer solutions require an extensive breadth and depth of interactions between the firm and the customer during the solution process (Biggemann et al., 2013; Jaakkola & Hakanen, 2013; Petri & Jacob, 2016). The high degree of interconnectedness through customer inclusion is key to create additional value to the solution. Nonetheless, the integration of the customer into the solution process can also carry some risks. Namely, Mustak, Jaakkola and Halinen (2013) present that customers might acquire the provider's expertise and subsequently offer the solutions themselves. For this reason, customers can sometimes be regarded as direct competitors. Also, their overall participation and willingness to share information, resources or capabilities during the joint solution process might be subject to customers' varying behavior or engagement enthusiasm.

Despite differences in literature on the processes within a solution (Malshe & Friend, 2018), the following four sequential processes by Tuli et al. (2007) have been largely identified as part of every solution: (1) requirements definition, (2) customization and integration, (3) deployment, and (4) postdeployment support. The sequence begins with jointly defining and mapping the solution requirements and specifications (Aarikka-Stenroos & Jaakkola, 2012; Sawhney, 2006; Petri & Jacob, 2016). This is considered key for customers as they can articulate their problems and discuss potential needs in reciprocal interaction (Rönnerberg Sjödin et al., 2017). Hereafter, the customization and integration processes follow. Whereas the customization process includes jointly designing, modifying or selecting products and services that fit into the customer's environment, the integration process entails the selection and integration of the resources needed (Rönnerberg Sjödin, 2013; Malshe & Friend, 2018). Firms must ensure that the different components seamlessly work together. After this sequence, the products are then being delivered to and installed at the customer's site (Aarikka-Stenroos & Jaakkola, 2012). This third stage in the solution process is called 'deployment' (Tuli et al., 2007; Petri & Jacob, 2016). It also comprises that the firm manages to understand the customer's personnel capabilities, and thus provides them with product-related information and trainings (Malshe & Friend, 2018), which results in an enhanced utilization of the solution. The fourth solution process entails postdeployment support services. This process involves maintaining the relationship with the customer by providing after sales services and by realizing evolving customer requirements (Tuli et al., 2007).

Although this process-centric view is widely accepted in the solutions literature, differences regarding the process-dimensions still exist. For instance, Töllner et al. (2011) enhance the solution process as they add signaling activities to the sequence. They claim that this process is moved towards the customer and therefore begins before the requirements definition process (Petri & Jacob, 2016). Moreover, Petri and Jacob (2016) further extend the conceptualization on customer solutions of Töllner et al. (2011) and Tuli et al. (2007). Here,

they identify a problem and need definition phase as starting point for a joint solution development due to their definition that “solutions are always responses to customer problems” (p. 1083). In addition, they note that customers approach firms due to their lack of capacity, expertise, market insight and legitimation. We adopt this conceptualization for the purpose of this paper but exclude the signaling activities as they mainly evolve and occur at the customer side (see Figure 1). Moreover, it is assumed that signaling activities are not performed in every customer-firm relationship. At the same time, extant literature by Marcos-Cuevas et al. (2016) and Aarikka-Stenroos and Jaakkola (2012) broadly coincide with the conceptualization of customer solutions, however they view the steps and processes as iterative and less identifiable rather than as sequential.

**Figure 1:** *Extended Conceptualization of Customer Solutions (based Sjödin et al., 2016; Petri & Jacob, 2016; Tuli et al., 2007)*



## 2.2. Value Co-Creation in Servitized Solutions

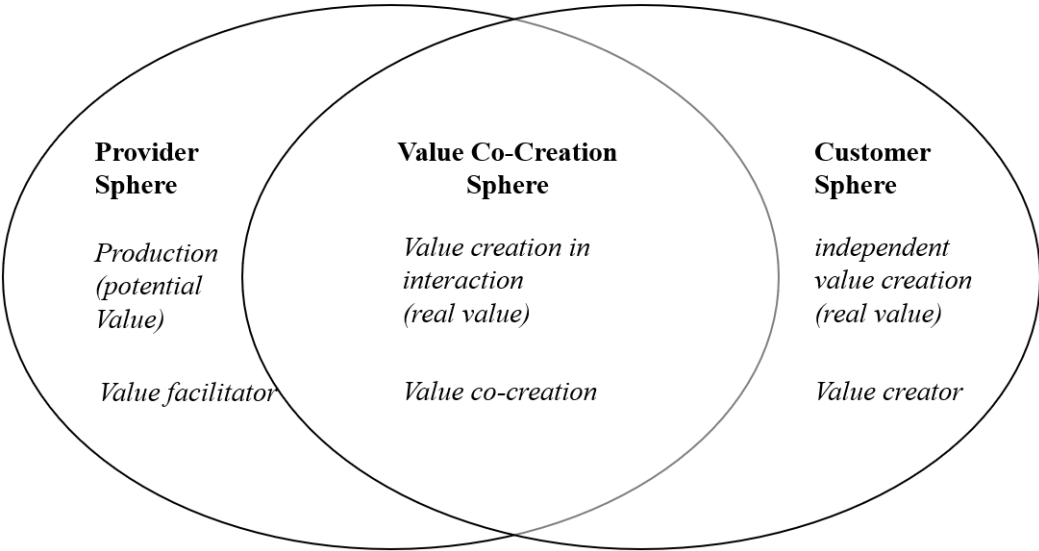
Understanding the value co-creation process during the joint solution process is key. Traditional views on value creation emphasized that customers are the co-creators of value, whereas firms are mere value facilitators as they only produce the resources *for* the customer (Vargo & Lusch, 2004; Grönroos, 2008; Grönroos & Voima, 2013). However, the service-centered perspective challenged this traditional view on value creation by explaining that firms can become co-creators of value as well, but only when direct interactions between the firm and the customer occur (Lenka et al., 2017; Rönnerberg Sjödin et al., 2016; Grönroos & Voima, 2013). Herein, the actors integrate and exchange knowledge, skills, resources and capacities. Therefore, product-service combinations have not only been regarded as strategic imperatives for manufacturing firms but also serve as platforms in which customer-firm interactions facilitate value co-creation processes and activities. This implies that firms have, due to the addition of services, the opportunity to co-create value *with* customers, which enables them to assert direct influence on the customer’s value creation process (Moeller et al., 2013). This is in line with the findings by Grönroos and Voima (2013) who argue that firms should understand customer practices in interaction in order to become a value co-creator rather than remaining a value facilitator (Malshe & Friend, 2018). Consequently, the actors in interaction are not restricted to their original roles and responsibilities anymore. Instead, they adopt and perform different roles that are intertwined, blurry, and not mutually exclusive (Bitner et al., 1997; Aarikka-Stenroos & Jaakkola, 2012). In addition to that, when firms and customers engage in direct interactions to co-create value during the solution process, it is assumed that both actors adopt active roles (Rönnerberg Sjödin et al., 2016; Grönroos & Voima, 2013). However, literature on this distinct yet important topic is limited. Therefore, contemporary scholars call for further elaborations on interactions and the performed roles in value co-creation processes to advance the conceptual

and empirical understanding (Aarikka-Stenroos & Jaakkola, 2012; Lenka et al., 2017; Grönroos & Voima, 2013).

As servitized solutions are co-created in the context of close and long-term relationships, the interactions between customers and firms can appear at different points or stages in the solution and value creation process, but yet the customer decides when to invite the firm to engage in the value co-creation process (Grönroos & Voima, 2013; Jaakkola & Hakanen, 2013). Therefore, it is critical that firms clearly understand the needs and wants of the customer in order to better align value co-creation practices, even though the firm must devote necessary resources and investments to maintain an enhanced relationship with the customer (Rönnerberg Sjödin et al., 2017). Nevertheless, interactions in the value co-creation process can also result in value destruction rather than in value creation since relational complexities or role misunderstandings can arise (Rönnerberg Sjödin et al., 2017). Consequently, this can lead to solution failures, interrelational conflicts or even to the termination of the collaboration.

To get a better understanding of value (co-) creation in business engagements, a visualization of the different value creation spheres, namely the provider, joint and customer sphere, is depicted in Figure 2 below. Research by Grönroos and Voima (2013) points out that the different value creation processes are neither sequential nor linear. Similar to the processes in the development of solutions, value creation processes are iterative and collaborative. Moreover, they do not run in parallel to the processes in the solution process (Jaakkola & Hakanen, 2013; Grönroos & Voima, 2013).

**Figure 2:** *Value Creation Spheres (Adapted from Grönroos & Voima, 2013)*



### **2.3. Roles in Value Co-Creation**

To advance and extend the understanding on the value creation roles of firms during servitized solution processes, it is crucial to include role theory to the current work. In general, role theory considers patterns in human behavior (cf. Biddle, 1986; Moeller et al., 2013). A role refers to expectations of behaviors for different positions that are set and influenced by cultural values, norms and beliefs in society (Biddle, 1979; Rönnerberg Sjödin et al., 2016; Moeller et al., 2013). Given the transition of thought of firms that interactions with customers are crucial to co-create value, which implicates that role changes occur, new challenges for firms emerge. Research by Rönnerberg Sjödin et al. (2016) claims that a lack of knowledge in what behavior to expect, and how to effectively respond to that behavior during interactions exist, which can negatively influence the solution and value creation process. Therefore, increasing the understanding in this research area is pivotal as firms that have clarity on the roles that are performed can better and more favorably respond to the respective behaviors and patterns of actions of the customers (Aarikka-Stenroos & Jaakkola, 2012; Moeller et al., 2013; Biddle, 1986). Simultaneously, the related predictability of interactions increases the level of trust, learning and information sharing among the parties involved (Tuli et al., 2007; Rönnerberg Sjödin et al., 2016). Consequently, firms can increase their performance, the solution efficiency and the overall customer satisfaction.

In the context of co-created servitized solutions, where close collaborations and dialogue between the customer and the firm are inherent, a role that is performed by one actor provides the other actor insights on the individual set of behavioral rules he or she possesses and performs (Edvardsson et al., 2011). Subject to assessing and responding to these role behaviors are individual experiences, interpretations and predefined organizational standards, which decide upon consecutive actions on what is socially allowed and what is not (Rönnerberg Sjödin et al., 2016). Whereas in the goods-dominant logic, the value creation roles of the customers (i.e. co-creators of value) and the firms (i.e. value facilitators) are unambiguously distributed (Vargo & Lusch, 2004; Grönroos, 2008), the service-dominant logic postulates the contrary, namely that the roles of firms and customers in interactions are less distinct (Rönnerberg Rönnerberg Sjödin et al., 2016), intertwined in nature and vary with collaborative activity (Alves et al., 2016; Aarikka-Stenroos & Jaakkola, 2012; Grönroos & Voima, 2013). For firms, successfully mastering the role dynamics in customer-firm interactions in servitized solutions is therefore key to co-create value. By doing so, Rönnerberg Sjödin et al. (2016) identify several strategies that can help firms to reduce role ambiguities within the given context, such as role clarification, role negotiations, participative decision-making or responsibility charting. In sum, these strategies aim to increase the mutual understanding of the roles and responsibilities of everyone involved. As a result, expectations and demands associated with the defined roles can be better fulfilled, which create value in turn.

Although literature and empirical evidence on the roles in the value co-creation process during servitized solutions is scarce, it is necessary to examine the role of the firms in more detail. As the addition of services creates opportunities for firms to engage with customers, which enables them to assert influence on the customer's value creation process, firms need to redefine themselves and adopt new roles in the relationship (Baines et al., 2009; Rönnerberg Sjödin et al., 2016). To date, the following firm roles in the value co-creation process have been identified in existing literature:



*Value option advisor:* in the initial phase of the solution process, the firm lacks a general understanding of the needs, the goals, the budget and the context of the customer (Tuli et al., 2007; Aarikka-Stenroos & Jaakkola, 2012). Therefore, both parties enter an intense dialogue in which critical information are exchanged. It is the responsibility of the firm to apply the specialist knowledge and experience it possesses to identify the customer's actual need. In some instances, customers face issues when articulating their problems, so the firm should have the ability to pose the right questions to define the problem and needs more accurately. Based on this interaction process and the firm's competences and experiences, the firm can design, outline and propose (alternative) options/solutions to the customer (Aarikka-Stenroos & Jaakkola, 2012). Clearly communicating or presenting each option's benefits and sacrifices to the customer creates additional customer value.

*Value amplifier:* the firm contributes its long experience, specialized knowledge, expertise and objectivity throughout the entire solution process to support customers' decision-making. Especially during the brainstorming process of the design and the production of the solution, customers perceive it as value-adding when firms incorporate their know-how and experience to create optimal value-in-use (Aarikka-Stenroos & Jaakkola, 2012). As customers regard the solution design as critical phase in the solution process, the active engagement of firms is therefore decisive to influence customer's value creation in a positive manner (Grönroos, 2011; Grönroos & Voima, 2013, Aarikka-Stenroos & Jaakkola, 2012). Furthermore, the close customer-firm relationship allows the firm to add additional services when needed. Customers perceive this as extended problem-solving activity than as a push for extra sales. This circumstance originates from the mutual trust in the competences and abilities which have accrued over time in the relationship.

*Value process organizer:* the organization and allocation of the resources is considered a key activity of firms in the solution process. Underlined by the findings of Aarikka-Stenroos and Jaakkola (2012) and Tuli et al. (2007), the role of the firm throughout the value creation process is the identification, collection and integration of the relevant resources to facilitate value creation. Simultaneously, the management of the integrated resources from both parties involved is regarded as value adding as well. In addition to these activities, customers highly appreciate when firms inform them about the current state of the process.

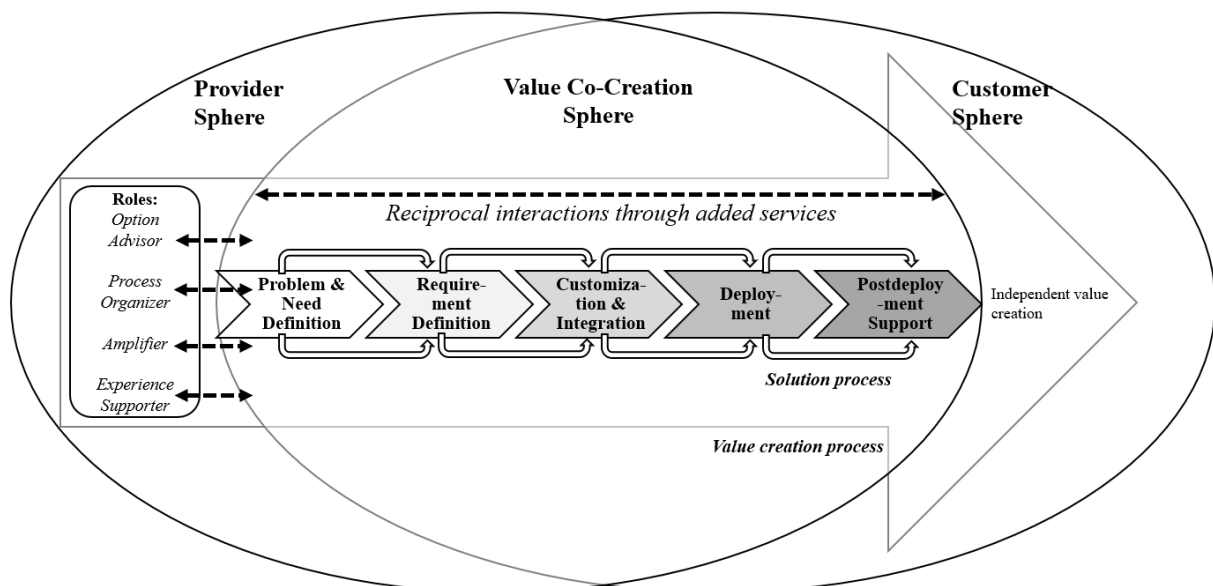
*Value experience supporter:* as far as the co-implementation of the solution in the later stages is concerned, firms can act as value experience supporter when they promote a better utilization of the solution due to their gained experiences. By doing so, this helps the customer to enhance greater value-in-use potential from the solution. Mostly, the firm can support the implementation and utilization of the solution based on previous experiences and their specialized competence in this field. However, this role is not restricted to the implementation phase only, but it can be adopted in other instances as well.

By synthesizing the information above, Fig. 3 presents an elaborated model which illustrates the *four different value creation roles firms* can adopt when co-creating solutions with customers in the business-to-business context. Thereby, the extended conceptualization of

customer solutions (see Tuli et al., 2007; Petri & Jacob, 2016) serves as empirical foothold where value co-creation processes between the firm and the customer occur. This five-stage model incorporates the following processes: the joint definition of the problems and needs, the determination of the requirements, the customization and integration of the resources involved, the deployment and postdeployment activities of the solution respectively.

As research on the value creation roles of firms in co-created solutions remains scarce and underrepresented (Grönroos & Voima, 2013; Moeller et al., 2013; Aarikka-Stenroos & Jaakkola, 2012; Petri & Jacob, 2016), this paper aims to explore, validate and extend the current understanding of the roles that have been identified in business research so far. In addition, this paper aims to contribute a managerial framework regarding how manufacturers can better make use of role dynamics, given the context of co-created servitized solutions.

**Figure 3:** Value co-creation (roles) in co-created servitized solutions (*Adapted from Grönroos & Voima (2013) and Lenka et al. (2017)*)



### 3. METHODOLOGY

#### 3.1. Research strategy

To advance the understanding of firm roles within the development of servitized solutions – a trending yet widely unexplored empirical phenomenon in existing business research – a qualitative research design was selected due to the exploratory nature of the topic (cf. Patton, 1989; Aarikka-Stenroos & Jaakkola, 2012). This study applies a field-based, abductive research approach to create theoretical propositions from case-based empirical evidence (Eisenhardt, 1989b; Dubois & Gadde, 2002). Case studies are predominantly used by qualitative researchers to increase the understanding of the topics that have previously been under-investigated, such as the firm’s role in customer solutions (cf. Gummesson, 2000; Jaakkola & Hakanen, 2013; Biggemann, 2016). They provide the researcher with detailed information, persuasive power and thus allow for grounded theory building (Eisenhardt & Graebner, 2007). In addition, case

study research enables the researcher to examine contemporary events within a real-life context (Yin, 2003). In this study, semi-structured interviews with firms operating in business-to-business markets provided the relevant data.

### **3.2. Research design and data collection**

In this study, a multiple case study design is employed. Theoretical sampling resulted in a selection of four cases that satisfied the following criteria (Tuli et al., 2007; Ulaga & Reinartz, 2011):

1. The firm is considered a small and medium-sized manufacturer who operates largely in the business-to-business market.
2. The firm has established long-term relationships with their customers.
3. The firm transformed their business from a product-centric to a service-centric approach and has developed the capabilities and resources to do so.
4. The firm can deliver customized product-service combinations (customer solutions).
5. The firm co-creates solutions with the customer.

Meeting these requirements ensures that the firm was either currently or previously engaged in a co-created solution process and possesses therefore considerable experience and expertise. Consequently, the firms can provide data about the phenomenon of interest. However, if one of these criteria was not fulfilled, the case was excluded from the sample. For instance, six cases were originally considered appropriate for this study, but as the in-depth interviews revealed, two cases did not meet each of the predefined criteria. Accordingly, four cases were selected. These cases differ in size, industry and location, which increases the likelihood to obtain diverse perspectives on the firm's roles in servitized solutions and to expand the external generalizability of the findings (cf. Eisenhardt, 1989; Yin, 2003; Jaakkola & Hakanen, 2013). This diverse set allowed us to gain a deeper understanding of the topic under investigation and strengthens the robustness of our qualitative study (cf. Eisenhardt & Graebner, 2007; Malshe & Friend, 2018).

The primary method of data collection was in-depth interviewing of decision makers within the selected case companies. More specifically, the interviews were conducted with two business directors, a chief operations manager, a product-service manager and his marketing assistant, as well as with a regional key account manager. The participants were all familiar with co-creational processes within their firm, either due to their own involvement in co-created projects, their long-lasting experience and/or their close connection to their customers. Personal contacts helped the researcher to get in touch with the participants.

While three interviews were conducted face-to-face, one interview took place via telephone. The interviews were conducted from July until October 2019 and lasted between 51 and 61 minutes each. In general, the semi-structured interviews comprised four domains which guided the conversations: (1) introduction, (2) servitization criteria to assess the appropriateness of the case, (3) firm's perspectives and practices in servitized solutions and (4) their value creation roles. With respect to the latter domain, an imaginary role play enabled us to gain deeper insights into the activities performed and roles taken over of each case firm involved. The interview questions were compiled and posed to encourage the participants to elaborate on

recent examples, anecdotes or other details which were deemed important. The questionnaire can be found in appendix 1.

The participants were not informed before or during the interviews about the value creation roles that exist in literature. This decision links with the abductive approach to validate and extend existing knowledge in the field of study. The data was documented in a standardized form after being audio-recorded and transcribed, which resulted in a dataset of over 45 pages. In turn, the transcribed document was forwarded to the corresponding participants to validate the statements. In addition, information from their websites, social media platforms and newspapers allowed for reconsiderations of the statements. Since this procedure is regarded as a form of secondary data collection, a triangulation of the data was ensured (Patton, 1999). This increases the trustworthiness and internal validity of the study. Table 1 below summarizes the most important characteristics of the selected cases.

Firm	Firm size			Industry	Country	Interviewees	Functional expertise
	1-50	51-500	>500				
Case A			x	Transport	Finland	1	GM
Case B			x	Electrical Equipment	The Netherlands	2	Marketing & Services
Case C	x			Renewable Energy	Germany	2	Operations, Sales
Case D	x			Construction Equipment	Germany	1	CEO

**Table 1:** Sample characteristics of firm interviewees

### 3.3. Data analysis

The aim of this analysis was to understand and advance current conceptualizations of firm's value creation roles in collaborative solution processes. The four datasets were analyzed as to the activities performed, the resources contributed, and the roles taken over by the firm within the co-creation process (Aarikka-Stenroos & Jaakkola, 2012). In this process, the constant comparison technique (Strauss & Corbin, 1990) served as appropriate means to analyze the data. Therein, iterations and comparisons allowed us to identify patterns of and within the dataset.

In addition, the collected data of the respondents was systematically documented and coded to further understand the phenomenon of interest. First, by rereading the interview transcripts for several times, phrases or signal words mentioned by the respondents could be highlighted that were similar or different across the cases (Nag, Corley & Gioia, 2007). By considering the findings in the literature, initial codes were created. Second, following the approach by Gioia, Corley and Hamilton (2013), we applied the first- and second-order analysis technique which results in a more systematic presentation of the data (see appendix I). During the first-order analysis, the coding technique helped to sort and structure the initial codes into the different role categories that have been identified. In the second-order analysis, links and patterns between the codes were identified, and the number of codes was reduced to develop new themes. The first and second-order themes combined build an aggregated and overarching dimension. This entire process enabled us to better identify, classify and assign the roles to the appropriate categories. Furthermore, a visualized coding scheme can simplify the overall

analysis process (Gioia, Corley & Hamilton, 2013). In total, 4 transcripts with 44 pages were documented. Two senior researchers independently counter-checked the coding process.

## 4. FINDINGS

The findings of this study comprise two different yet interrelated processes: the joint solution process and the value co-creation process, whereas the latter one takes place during and after the solution process (Aarikka-Stenroos & Jaakkola, 2012). The data portrayed the activities, resource contributions and roles taken over by the firms in the value co-creation process with the customer. The next sections display the different findings derived from the interviews. They are organized and presented according to the five solution processes in which collaborative activities between firm and customer occur: 1) problem and need definition, 2) requirements definition, 3) customization and integration, 4) deployment, and 5) postdeployment support activities. Afterwards, an elaboration and validation of the value creation roles of the firms is presented. Nonetheless, it is important to reconsider that collaborative activities occur in an iterative or parallel rather than in a linear fashion. Circumstances, interests or expectations can change over the course of the collaboration; thus, the activities and processes need readjustments as well. In addition, any forms of disagreement between the firm and the customer might result in a termination of the collaboration. The final part of this section presents five strategies that help firms to better manage role dynamics.

### 4.1. The Solution Process

The following section entails the activities performed and resources contributed in the solution process.

#### *Problem and Need Definition*

The data indicate that the co-creation of solutions begins when problems and needs are discussed. This initial and interactive process allows firms to engage with their customers. It was found that experience and specialist knowledge support the firm's ability to determine customer problems and needs. The data also suggest that long-term relationships between the firm and the customer build the basis for an effective co-creation. As one of the interviewees pointed out:

*“We have long-term relationships with our customers, and we know them quite well. We know what they are doing, we know what they are transporting, through ongoing discussions. We visit them, they visit us.”* [Director, Case A].

In this context, long-term relationships facilitate an enhanced mutual understanding of the problem, and the firms can pose pointed questions to assist the customer in articulating his problem: *“we usually play a game of questions and answers”* through which *“we help him to define his problem”* [Operations Manager, Case C]. Thereby, firms must know when they must listen carefully to the customer, and when they must guide the customer in his description of the problem. One of the interviewees commented that *“when you don't listen to your customers, you don't provide the right solution”* [CEO, Case A]. Based on this procedure, the firm becomes better aware of the problem, and is therefore better able to diagnose the appropriate need. This reciprocal interaction process is considered crucial to jointly agree upon a common goal in the form of a solution, even though the firms explained that customers must be transparent and collaborative in this process. The interviewees noted that this is the prerequisite for a successful collaboration.

### ***Requirements Definition***

Tuli et al. (2007) note the requirements definition phase “is a key part of the solution” (p. 5). The findings from the dataset support this statement, as the firms and customers are in close negotiations to determine the specifications of the solution. Accordingly, the frequency and intensity of interactions increases as well as the number of firm experts involved. The interactions are mostly mediated through technology, such as email and phone, to save costs and time. The transcripts indicate that firms however prefer to meet face-to-face with the customer to discuss the requirements in detail, not only to also develop relational ties but to get a better understanding of the customer and his (future) needs, too. These negotiations about the requirements typically involve multidisciplinary and “*dedicated teams*” [Service Manager, Case B], which are compiled by the firm. In collaboration with the customer, information are exchanged and the overall feasibility of the solution is then discussed. Moreover, the common interest in the solution ensures a high level of dedication, which improves the quality of the discussions.

Whereas the customer puts forward his requirements, such as budget and time frame or certain product specifications he needs, the firm must present corresponding solutions possibilities. One of the interviewees commented:

*“we take over the role of a technical expert in our specific market for his need. We must take care that the requirements he desires are in line with the legal environment. These things are probably not the expertise of the customer, but this is ours.”*

Nevertheless, requirements are not necessarily articulated by the customers, but also by the firms. Without the realization of these firm-set requirements, solutions cannot be installed at the customer’s site because preconditions are not suitable, as one interviewee stated. To ensure this, however, the firm develops customized checklists for each project, which are later transferred to the customer. “*Experience has taught us [the importance] to do so*” [COO, Case C] to prevent any unfavorable circumstances that hinder the installation. Therefore, the firm places calls on appointed dates to doublecheck that the requirements are met from the customer

After the firm and the customer found consensus about the solution requirements, the data illustrate that optimal planning is one of the key tasks firms must perform to create value for the customer. Thereby, close collaborations with the customers are necessary to jointly decide upon proceeding activities. This enables the firm to better adjust the planning and to streamline operations.

### ***Customization and Integration***

After the requirements were determined, the firm and the customer move towards the design phase, which is part of the customization and integration process. In this phase, firms strive to actively engage with the customers to tailor the design as close as possible to the needs of the customer. Firms recognized the need to integrate customers in this phase due to “[*customer’s] knowledge and expertise of their industry*” [CEO, Case D] while “*we possess extensive knowledge in our field and the factories*” [COO, Case C]. During this phase, different knowledge sources are taken together to create an appropriate solution design. In some instances, the firm also steers the design process by asking specific questions to the customer to derive additional knowledge and industry insights. Also, the data indicated that firms organize critical design reviews to validate the predefined requirements together with the

customer. This offers the possibility to receive immediate customer feedback with which to further adjust the design if needed.

The data also indicate the importance of presenting reference cases or exhibition pieces to the customer. This enhances the customers' value perception as he becomes better aware of what to expect from the solution and can thus reevaluate his decision. Simultaneously, the firm is better able to explain the potential benefits and sacrifices of each product. This positively influences customers' value creation, as the following citation illustrates:

*“it is our goal to show him how things do work in practice to make his wish work. If we have an experience from a project or product before, we can show it to him as well. Our expertise from our defined areas is important to show”.* [Director, Case A]

Another interviewee commented in a similar vein, albeit he operates in a completely different industry:

*“After we have agreed upon the solution specifications, we invite the customer to our location. We have exhibited most of our core products and machines that we sell. This is very impressive and helps that our customers convince themselves about the products.”* [Sales, Case C]

Concerning the product development, the data reveal that most of the firms form interorganizational teams in which specialist workers from the firm cooperate with the respective employees from the customer. Herein, existing knowledge of the different parties is shared and coordinated to facilitate better decision-making. Within these teams, predefined contracts state the responsibilities of each party to guarantee an effective solution development. This enhances the overall solution quality. However, the data illustrate that an adequate management of the different parties involved is of great importance, too. Therefore, firms lay emphasis on *“bringing the right management skills into the collaboration”* [Service Manager, Case B] to enable and guide an optimal collaboration process.

The following phase encompasses the integration of the different resources that were contributed by both parties involved. Firms must exploit the sophisticated knowledge and experience it possesses to integrate the appropriate parts into the solution, while customers are asked for acceptance and verification on a regular basis. For instance, in case the customer demands product alterations, the firms consider flexibility as important attribute which customers highly value. The following citation illustrates these findings:

*“[in the customization process] you ask the customer to come over, look at all the specifications and requirements once again, the design, the single parts. In the end of this process, the machine has to function of course. We have to make sure that we integrate the customized attachments to the product and that it works. We discuss it then with the customer if the product solution meets the customer requirements [...] or if it needs alterations”* [CEO, Case D]

The coordination and decision-making over the course of the integration phase thus takes place jointly. To some extent, firms enable customers to become co-producers of the solution when they add their own physical resources to the integration process. This form of co-creation is the result of long-lasting relationships, a mutual understanding of the customer's capabilities and

an intense information exchange. However, the realization of this is subject to several factors, such as firm strategy, customer engagement and industry.

In the raw production process of the solution, the data point to the absence of the customer since this is the main competence and responsibility of the firm. The customers expect the firm to perform this activity in the solution process. Therefore, a declining intensity of interaction in this customization and integration process was visible.

### ***Deployment***

The deployment of the solution constitutes another opportunity which firms can exploit to create value for their customers. During the solution deployment, reciprocal interactions between the firm and the customer are inherently present. The ultimate objective of the firm is to ensure that the solution works as expected and that it fits to the customer's working environment. When the customer employs the solution, the usage should be simple, flawless and well-functioning. Therefore, almost all interviewees underline the importance to introduce the customer to the product before its first operation. It is the firm's responsibility to share the product knowledge and explain the interplay of the different components to advance the overall understanding of the product for the customer. However, the interviewees note that customers have, in some instances, even greater product knowledge than the employees of the firm since they *"use the equipment in their daily work and thus know the tricky things"* [Director, Case A]. This indicates that customers are an additional source of competence in the deployment of the solution, however firms must be open to feedback and improvement suggestions by the customers. In other instances, initial requirements, interests or expectations of the customers changed over time, and thus they demand adjustments during the collaborative deployment process. In the words of an interviewee: *"customers suddenly become aware of the actual problem or they alter their perspective. We see that especially in highly specialized products that the customer has changed his interests or suddenly lays emphasis on other product specifications [...] And then we search for a possibility to alter the machines based on the customer needs"* [CEO, Case D]. In line with the statements of the other interviewees, customers highly value flexibility and speed in these kinds of processes. Therefore, the interviewees state the importance to establish direct communication and mutual support to generate satisfactory results.

In addition, the data suggest that an adequate planning builds the basis for an effective deployment process. Due to firms' experience in deploying solutions at the customers' locations, they are responsible for working out a plan which is geared to each other's capabilities and operational schedule. This takes place in close coordination with the customer. Ultimately, the plan is exchanged and presents a timeframe for proceeding operations. Also, firms commonly provide instruction booklets to their customers after the collaborative deployment process to facilitate a better and more efficient utilization of the solution. In addition, the firms offer specific trainings to the customers.

The data imply that firms lay emphasis on demonstrating the quality and functioning of the product while jointly deploying the solution. This is proven by the statement of an interviewee who argues that *"performing an operation together with the customer is really important for us and to show him that everything is working"* [Service Manager, Case B]. As a result, customer satisfaction increases, and thereby his willingness to promote the solution to others.



### ***Postdeployment Support***

The postdeployment support activities receive increasing attention by firms as they regard them as platform to uphold close relationships with the customers. Progressive support activities such as (predictive) maintenance, repairing or overhauling, guarantee solution longevity and good performance quality. Since both firms and customers expect the solution to work smoothly, firms across the industries are aware of the fact to provide appropriate services after the solution was delivered to the customer. The data demonstrate however that the service activities offered by the firms can vary per customer as well. Due to the different solution characteristics, one interviewee noted that after the initial deployment, service activities and interactions with the customer take place more frequently to configure, optimize and align the solutions to his needs. Afterwards, maintenance works are performed upon consultation with the customer, but regularly occur two to three times a year. To perform these activities, firms compose and send specialist teams to the customers which carry out the distinct operations.

Servitized firms strive to engage with the customers to exchange information about the solution and to better understand its application practices. This implies the effort to jointly identify existing problem in the solution system, and the customer has gained experiences through the daily usage. Solving the problems in a fast and efficient manner is then considered utterly important to prevent any sorts of further malfunctions or overall customer dissatisfaction.

At the same time, the interviewees describe the importance to exploit new technologies. For instance, telematic systems enable the firms to maintain machines in advance, which reduces downtimes. Through status and utilization tracking, firm experts are better able to give advice to specific operations performed by the customer. In this regard, the data facilitate the interactions, which are then mediated through technology. This, in turn, indicates little value co-creation opportunities for the firms since direct human-to-human interactions are lacking.

## **4.2. Value creation roles of firms**

This section presents the different value creation roles of firms during the co-creation of servitized solutions. The data confirms the existence of the four value creation roles of firms (i.e. value option advisor, value process organizer, value amplifier and value experience supporter) while the analysis resulted in a discovery of a new value creation role, too: value presenter. In addition, the gathered data reveal that the roles are intrinsically intertwined, cannot be disentangled and vary in its adaptation. This circumstance originates from the differing customer contexts and stages in the solution process which firms must adapt and respond to. An overview of the coding scheme is visualized in the appendix (see Fig. 5).

### ***Value option advisor***

The data indicate that firms play a vital role after the problem is determined and solution possibilities are proposed. In this instance, our data coincide with the findings of Aarikka-Stenroos and Jaakkola (2012) that firms act as *value option advisors*. All firms across the sample utilize their specialist knowledge, their gained experience or their network power to advise other solution options to the customer's problem. The following citations correspond to the value option advisor role:

*“[our specialists] advise the customer a certain machine for his problem that also fits to his working environment. When this is not satisfactory enough or requires more specialization because it does not fit to the operations of the customer, we look into the*

*market if another product already exists, or we make a tailor-made solution” [CEO, Case D]*

*“It helps us enormously when you know your customer for a long time, when you know, what the customer firm and the customer are capable of. When certain problems [with the solution] arise, we can we give him improvement suggestions, we advise him to take other products which rather meet his demand.” [COO, Case C]*

*“we always try to get the customers to come to our factories because that is one of the best ways to figure out what he really wants and needs because then you can look at other customer solutions we have made before, and we can give the customer ideas based on that as well.” [Director, Case A]*

The analysis of the data reveals the importance of this role as firms adopt it to positively influence the value perception of the customer. Similarly, reference cases from previous projects serve as an additional strategy to demonstrate alternative options and the quality that is associated with it.

### ***Value process organizer***

During the co-development of servitized solutions, the analysis reveals that all firms adopt the role as *value process organizers* as they structure and coordinate the solution process. Since customers usually lack the knowledge, capabilities and experience to do so, it is the responsibility of the firm to organize and integrate processes and resources required to compose satisfactory solutions. This indicates that customers expect the firms to take the lead in coordinating the activities and resources that are needed. In all cases, a proper documentation regarding the solution requirements and expectations was evident. As it has been recognized in the data, nearly all firms share their documents with their customer and inform them mostly via phone about the solution progress. In addition, the data reveal that large firms typically formalize different responsibilities and activities of the parties involved in contractual agreements. This provides clarity for both the firms and the customers, and makes them therefore liable and interested to engage in the joint solution process. The following statements by a chief operations officer reflect the adoption of this value creation role, as he commented:

*“in my position [as COO], I am responsible for organizing all the processes, so that the machine is not only customized to the needs of the customer, but also successfully delivered and deployed. I am the connection link between our specialist teams and the customer.” [COO, Case C]*

He advances his statement later by noting:

*“[after the negotiations regarding the requirements took place,] we send a checklist to the customer in which it is clearly stated which tasks he has to accomplish before we come to assemble the machine. Two weeks and two days prior to the fixed date for assemblance, we call him to doublecheck if they have been fulfilled, so that we can actually deploy the solution at his place.” [COO, Case C]*

In other words, the service manager of an electrical equipment firm stated: “*we organize the complete operational availability*” [Case B] to ensure that operations are constantly running. This form of outsourcing of internal capabilities is more frequently used, as the interviewees comment, as the customer can reduce costs and the firm can create customer value. Moreover, the interviewee mentioned that one of their key activities is to organize and integrate the resources that have been purchased from their suppliers into the solution. This proves in addition that firms act as value process organizers to create value for their customers. However, the statements also indicate that customers expect their firms to do so. Overall, firms play this role as they strive to guarantee a coordinated and thus efficient solution process which positively contributes to customer’s value creation process.

### ***Value amplifier***

The analysis of the interview transcripts demonstrates that firms take over the role as *value amplifiers* in the co-development of servitized solutions. This is in line with the conceptualization by Aarikka-Stenroos and Jaakkola (2012), although their research was conducted in a slightly different context. The dataset suggests that firms act as value amplifiers mostly while co-designing the solutions with the customers. During these joint processes, close collaboration and dialogue is established, which enables firms to participate and engage in customer’s value creation process. In all cases, firms share their specialist knowledge, experience, methods and tools to improve the value outcome of the solution. The following statement exemplifies firms’ awareness and performance of this role:

*“We have combined development teams. This means that people from the customer are joining our development teams. There are moments in the design in which we do reviews together with the customer. This can be categorical design review, product design review”.* [Service Manager, Case B].

Furthermore, the data demonstrate the positive influence of digitization to amplify the value-in-use during operations. For instance, one interviewee indicated that telematic systems support the identification of system errors in advance. Therefore, the firm can send specialists to the customer to repair and replace the specific parts. At the same time, the data provide insights regarding customers’ utilization of the machine, and the firm can thus give advice to increase overall efficiency. This amplifies the value of the object of exchange as it guarantees operational availability and reduces costs through better utilization.

### ***Value experience supporter***

The statements of the interviewees reveal that the smaller firms support a better application of the solution by giving improvement suggestions based on their experiences to the customer. In line with the findings by Aarikka-Stenroos and Jaakkola (2012), firms act as *value experience supporters* in servitized solutions to create additional customer value, usually in the deployment and postdeployment phase. During this process, long-term relationships support an effective and trustworthy communication while this strengthens the intensity of the collaboration at the same time. Since both parties deploy the solution together, and interactions are thus inherent, the firms inform or instruct the customers about how to use the solution more efficiently. This is proven by the statements of an interviewee, as he pointed out:

*“we send somebody to instruct and inform them about how to use it. And how to use it efficiently. For instance, with customized attachments, we try to ensure that the customer knows how to work with them as effective as possible, that they are used in the correct manner [...] or we provide them with tips and suggestions how to fuel more efficiently, which reduces costs. In all our processes, we do our best” [CEO, Case D].*

Another interviewee from another case responded in a similar vein, which underlines that they act as value experience supporters, too:

*“We have made the experience that we must tell the customer, after the implementation and training took place, that he should engage with and test the machine to better understand the functionality. In the electrical control box, we attach a drawing which describes the effect of pressing certain keys. This is a detailed list of all parameters. This is integrated in the control of the machine” [COO, Case C].*

The latter practice serves to get to know the machine in a faster and more effective way, which saves additional costs for the customer as specialists of the firm must not instruct them once again. Furthermore, it became apparent that the electrical equipment manufacturer lays emphasis on performing operations together with the customer, as he is witnessing the functionality in three different occasions. In doing so, the specialists are then able to provide product-related information, and they can support the customers with their experience to increase the utilization of the product.

### ***Value demonstrator***

With respect to the dataset, an additional value creation role has been identified that firms adopt in the co-creation of solutions. Firms act as *value demonstrators* as they may present reference cases or comparable solutions to their customers to positively influence customers' value perception. Especially in the context of solutions, the interplay of the different components that are integrated is of huge importance. Thus, when firms present previous cases to their customers, they strive to convince the customers as they raise awareness about their specialist knowledge, the capabilities they possess and about the good quality of the products. Successful illustrations regarding the functionality of the products enhance customers' understanding about the product and connote that collaborations with the customers do work out. Therefore, customers become more aware of what to expect from the solution outcome, which decreases uncertainty. Simultaneously, a fruitful dialogue is established, and information can be exchanged. As the data suggest, both the smaller firms as well as the construction equipment manufacturer perform this role, whereas it is typically applied during the requirements definition and customization process. In one instance, the CEO of the construction equipment commented *“to show him the [mowing] machine from the front”* [Case D] is important, while in another instance, a Sales Manager noted: *“we have exhibited most of our core products and machines that we sell. This is very impressive and helps that our customers convince themselves about the products”* [Case C]. The described messages coincide with the statement by the Director of a transport firm.

*“We have quite a long experience and can compare [the solution] to other cases where we have made products for with a similar purpose. In that stage, we can perhaps deliver ideas to the customer. In some cases, the customer has an idea about*

*what he wants to have [changed]. We can also tell him what kind of experience we have and therefore, change the products in such a way that his needs are fulfilled”.*  
[Director, Case A]

This form of showcasing is therefore considered crucial to increase the level of mutual understanding and trust in the partnership. The role of the firm as value demonstrator is therefore existent, as the analysis of the data concludes, and is performed to create additional value for the customer.

### ***Value manager***

Firms act as *value managers* while they co-create solutions with their customers. The data confirm that firms provide the direction of the process, manage the (team) cooperation, propose optimal solution suggestions while mitigating risk contingencies. In addition, it was recognizable that firms actively engage with customers when it comes to decision-making, as they constantly ask for verification and acceptance before they proceed to a next phase. This indicates that firms are also aware of the role of the customers, as they are regarded as important source of competence. The statements by two interviewees from two different firms, industries and countries provide evidence for this. One of them mentioned that *“some customers really have a clear view of what they want. Sometimes, you have a customer who comes to our site and wants to do it. Then we must manage it. I try to do that”* [CEO, Case D], whereas the other one states that *“we must bring management skills into the collaboration”* [Service Manager, Case B].

Similarly, the interviewees also claim that it is important to clearly articulate to the customer if the discussed solution cannot be realized. This form of immediate and honest feedback might negatively affect the value creation process of the customer at first, but when suggesting alternative solution options later might solve the customer problem again. From the firm’s vantage point, this procedure is perceived as value adding. One interviewee noted that *“we have to tell them directly that this solution cannot be provided by us. We tell them mostly then which companies he must approach, which companies offer these kinds of specialized products, or where to look at in the market to get his needs fulfilled”* [CEO, Case A]. An open and straightforward communication between the parties involved is therefore essential and can affect the value co-creation process positively, too.

### **4.3. Firm Strategies**

The analysis of the statements reflects that both firms and customers adopt different roles during the co-creation of solutions. In addition, it has been recognized that these roles are not adopted sequentially during the solution process; they are inherently blurry, intertwined in nature and performed situational, which proves the existence of role dynamics. Managing these dynamics in an advantageous manner is therefore extremely important for servitized firms, as they are better able to control and coordinate the roles, and therefore increase productivity and efficiency of the overall collaboration. To succeed in this, however, our analysis identified five strategies that help firms to better make use of the role dynamics. We eventually merge these strategies with the initial tentative framework (Fig. 3) in order to present a strategic framework for managers which is applicable for practice.

**Promote Awareness.** The analysis revealed that many firms (i.e. the employees) are not aware that they perform different value creation roles during the servitized solution process, and they are not aware that customers adopt different roles either. The following quotes portrays this finding:

*“I think I am aware, but I don’t know if everyone is aware.”* [Service Manager, Case B]

and

*“to some extent [I am aware that different roles are adopted], but for us it is quite a normal way to work with the customer. We have not been following a systematic way for that”.* [Director, Case A]

To address this lack of awareness, managers can implement strategies through which the employees get informed about the different roles. Therefore, the employees that are in direct interactions with the customers can better recognize and react to the customer roles, which can positively affect the dynamic of the collaboration. The importance of creating an awareness of the roles is mirrored in one of the statements of the interviewees, who noted that:

*“when an employee is not aware of their role, they sometimes do not put in the effort that creates value and that is demanded and expected by the customer. When they are not convinced that they play a role, or that the customer does not hear that voice, they are probably not determined to suggest or perform the processes needed for a solution, or to set the next step for the customer. [...] An overall and better understanding could be important to create more value.* [CEO, Case D]

This quote indicates that an awareness of the different roles is key to positively influence the value co-creation process through adequate reciprocal interactions.

**Formalize Contractual Agreements.** Setting up contracts together with the customer is another type of strategy to better manage role dynamics. This helps to formally allocate roles and responsibilities to the respective parties in advance. At the same time, this increases the mutual understanding, and value expectations on the collaboration or the solution outcome can be shared. With this knowledge, firms can better facilitate satisfactory interactions with the customer, which create customer value. Especially in large projects, it became evident that all firms drew on contracts in which they predefined tasks and responsibilities with their customers, as the following citations illustrate:

*“These contracts are extensive contracts in which it is also documented who has to do what”.* [Case B]

*“We agree on a contract [before we develop a solution]. In most of the cases, we discuss who takes over which responsibilities, and as soon as the contract is signed by the customer, it becomes valid”.* [COO, Case C]

Firms can better prepare for the customer roles, and vice versa, as the behaviors become more predictable. Therefore, a binding contract is essential to streamline a smooth collaboration and to deal with role dynamics.

**Documentation.** Our analysis reveals that it is inevitable to maintain proper documentation during the joint solution process. This proposition is in line with the findings by Tuli et al. (2007) as they identify documentation emphasis as key variable in the development of effective solutions. The data suggest that firm employees should be required to document several aspects of the solution, such as solution outcome, work performed, or roles taken over. This form of documentation serves to better memorize (in)effective response experiences to customer roles. By doing so, potential pathways for future interactions can be derived.

Although not all interviewees clearly point out that they currently follow this practice, the director of a transport company stated:

*“we [document the outcomes and activities performed] because we think it is very important for later to also know the background when the customer comes back. Then we know a direction of what he wants for the next time. We try to keep up a good documentation for everything”* [Case A]

The documentation should be shared within the different internal departments but also with the customer, so that everyone involved is aware of the roles and responsibilities during the solution process. Consequently, interactions can be better coordinated through which customer value can be created.

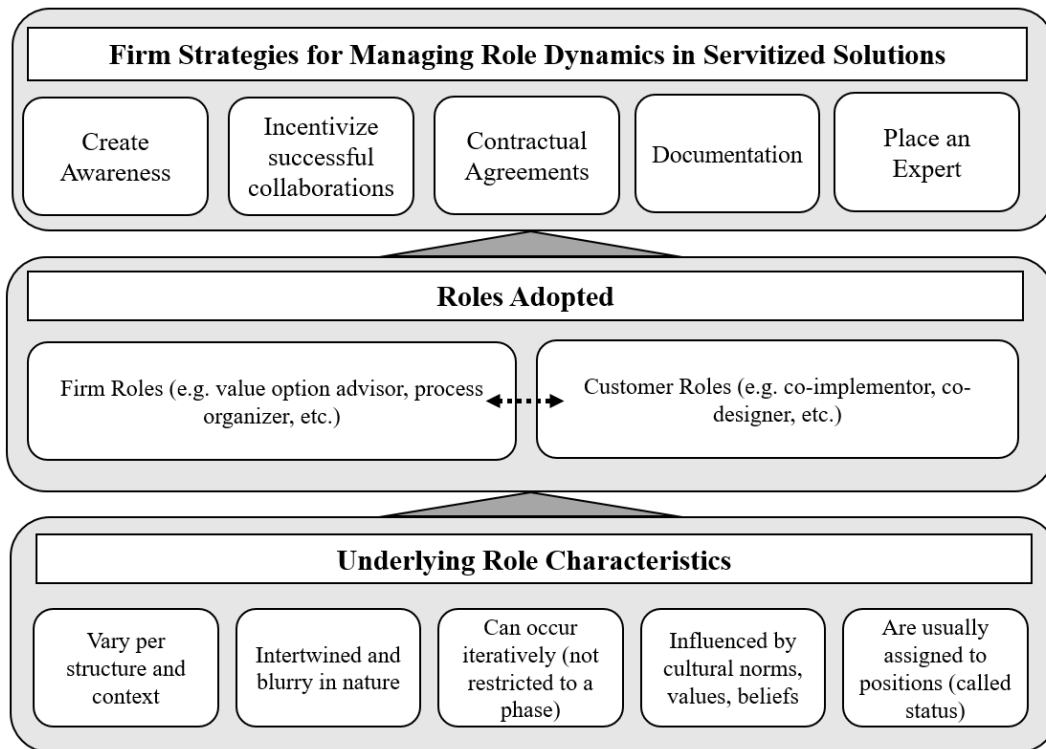
Nevertheless, the data indicate that this strategy is subject to project size and firms' prescribed strategy.

**Incentivize Successful Collaboration.** Furthermore, the analysis suggests the strategy to incentivize successful collaborations, ones in which the appropriate coordination of firm- and customer roles had an overall positive effect on the outcome. That is, created value for the customer as it reduced cost, time and effort. A key feature of this strategy is that both parties *“put on the table on what has been experienced in the collaboration [from before] ... and to consider the customer perspective at all times”* [Director, Case A].

Positive feedback received by the customer after the solution has been designed, developed, or deployed may result in employee benefits. This drives commitment and a more effective coordination of the processes.

**Place An Expert.** With respect to the data, it becomes obvious that no firm follows a systematic way to recognize and respond to customer roles. Instead, the firm employees react to customer roles rather spontaneously, and they incorporate both private and professional experiences into this interaction. We suggest that placing an expert who is responsible for coordinating the solution process helps to better manage role dynamics. Thereby, he serves as an experienced and reliable contact person who arranges good internal and external (i.e. with the customer) communication, establishes close relationships and proper documentation, and most importantly, is knowledgeable about role response methods. Moreover, the expert is responsible for educating and informing firm employees of the role dynamics. By installing an expert for this specific area, we assume that additional and sustainable value can be created.

Based on all the information from above, an advanced theoretical framework is created (see Fig. 4). This framework incorporates the identified five supplier strategies as they build the foundation to effectively co-create servitized solutions.



**Figure 4:** Firm strategies to manage effective solution co-creation

## 5. DISCUSSION

This section discusses the findings of the study and relates them to existent literature. The notion has been supported that the addition of services inherently increases reciprocal interactions, through which firms can engage and enhance customers' value creation process (Baines et al., 2009; Grönroos, 2011). Moreover, the findings confirm the existence of role dynamics in co-created servitized solutions, as firms and customers adopt different roles within the stages of the solution process unconsciously (Aarikka-Stenroos & Jaakkola, 2012). In addition, the findings also provide evidence for the absence of systematic strategies to manage these role dynamics adequately.

Given that literature on value creation roles of firms in servitized solutions with business customers is largely underrepresented, this paper addresses the calls for consideration as it advances the understanding of this phenomenon. The results provide empirical evidence for the heterogeneity in firm roles: value option advisor, value process organizer, value amplifier, value experience supporter, value demonstrator and value manager. At the same time, the findings advance the understanding, validate (Aarikka-Stenroos & Jaakkola, 2012) and extend firm role conceptualizations. These roles are characterized as blurry, intertwined and overlapping, and they are performed as responses to (customer) behaviors or expectations (Biddle, 1986; Bittner et al., 1997). Moreover, the roles can occur iteratively, at different points, and they are not bound to specific phases in the solution process (Grönroos & Voima, 2013; Rönnerberg Sjödin et al., 2016; Biggemann et al., 2013).

With respect to the research question, how providing firms can better make use of role dynamics in co-created servitized solutions, we identified five strategies firms can apply in practice: promote awareness, formalize contractual agreements, documentation, incentivize successful collaborations and the placing of an expert. They help to overcome the challenges that are involved in the management of role dynamics.



## 5.1. Theoretical Implications

The purpose of this paper was to advance the understanding on role distribution in servitized solutions in the B2B context. Thereby, extant literature findings were combined with empirical validations to explore and extend the knowledge in the widely underrepresented topic of interest (Grönroos & Voima, 2013). Consequently, this paper closes this gap in servitization and value creation literature as it (1) presents six value creation roles firms may adopt in servitized solutions to positively influence the value creation process and (2) provides a framework which helps firms to better manage role dynamics in the co-development of servitized solutions. We found empirical evidence that firms take on different value creation roles when they engage with customers in the co-development of servitized solutions. While many studies increasingly focus on examining the roles of the customers in servitization (Moeller et al., 2013; Agrarwal & Rahman, 2015), many studies neglect the important role that firms still possess to create value. Therefore, the focus of this paper was directed at deepening the knowledge concerning the firm, rather than of the customers (Aarikka-Stenroos & Jaakkola, Agrarwal & Rahman, 2015).

The first contribution of this study is that we have provided an advanced understanding of the value creation roles firms can adopt in servitized solutions. Furthermore, we have extended current conceptualizations as we added the roles: value demonstrator and value manager, respectively. Prior to this study, little has been known about the roles performed in co-created solutions (Green et al., 2017; Baines et al., 2013; Moeller et al., 2013). With the addition of the two roles, however, an enhanced understanding of the role dynamics in servitized solutions is gained. We provided empirical evidence that the four roles that have been elaborated by Aarikka-Stenroos and Jaakkola (2012) are also found in the servitized solutions context. This study therefore provides valuable insights for academics and practitioners on how firms can exploit the opportunities of service-facilitated interactions in servitized solutions to co-create value (Rönnerberg Sjödin et al., 2016).

In addition, this study contributes to the servitization literature as well as it illuminates the activities performed by firms to co-create value during servitized solutions. By taking the solution process as empirical handhold where co-creational activities and interactions occur, this study shows that firms mainly create customer value when they share knowledge, resources and skills, as well as when they guide the customers through the different sequential process.

Another contribution of this study is that it provides strategies on how to manage role dynamics in co-created solutions. In particular, our analysis outlined that firms should (1) promote awareness, (2) formalize contractual agreements, (3) maintain proper documentation, (4) incentivize successful collaborations and (5) place an expert with a supervisory and delegating function. These strategies coincide to some extent with the findings by Tuli et al. (2007), as he proposed variables enabling solution effectiveness. The lack of information in this narrow research area identifies this strategic framework therefore as important contribution to solutions literature. Moreover, the provision of strategies does not only increase the overall understanding on this topic but also stimulates researchers to examine value co-creation in this and/or in other co-creational contexts in more detail (Lenka et al., 2017; Rönnerberg Sjödin et al., 2016). Following up on this, the current study can set the fundament to develop additional comprehensive frameworks which further examine both positive and negative outcomes of customer-firm interactions (Malshe & Friend, 2018; Grönroos & Voima, 2013; Sjödin et al., 2016).

In addition to that, the study contributes to extent literature on role theory and servitization as it displays the dynamic nature of role adoption in co-created servitized solutions (Marcos-

Cuevas et al., 2016; Tuli et al., 2007; Rönnerberg Sjödin et al., 2016). More specifically, the current study finds that roles are enacted in different forms during the solution process, and that they do not emerge sequentially as the solution process develops (Rönnerberg Sjödin et al., 2016). Rather, they are subject to expectations influenced by society, norms and beliefs (Biddle, 1986; Bitner et al., 1997).

## **5.2. Managerial Implications**

The contribution of this paper is especially relevant for managers of manufacturing firms. As this paper emphasizes, traditional views on the roles of firms and customers in the value creation process are out-dated. Instead, firms should pursue a strategy which seeks to actively engage with the customers during and after the solution process, where close collaborations and dialogue are prominent, to develop satisfactory solution outcomes and to facilitate value co-creation (Malshe & Friend, 2018). Therefore, this paper prompts managers to re-evaluate their current approaches regarding value creation. In this context, this study identified six roles firms can perform while interacting with their customers during the solution process. In addition, this paper offers advice to managers because it illustrates strategies how firms can better make use of role dynamics in co-created servitized solutions in B2B environments. Firms can utilize the advanced framework (Fig. 4) to recognize roles that are adopted by the customer, and can thus respond in a more advantageous way.

The first managerial implication of this study is that firm managers must be fully aware of the important role customers have in the joint solution process, as they are not only considered a necessary resource in the development process but also are the only determinants of the real value of the solution (Grönroos & Voima, 2013). Understanding and supporting these customer roles is therefore inevitable for firms, and it positively affects the overall value creation process of the customer (Anning-Dorson, 2018; Grönroos & Voima, 2013). Indeed, many servitization studies confirm the success of effective customer participation on both a solution process and the broader servitization strategy of a firm (Mustak, Halinen & Jaakkola, 2013; Moeller et al., 2013; Agrarwal & Rahman, 2015). With reference to the examined solution process throughout this study, it became evident that direct interactions (i.e. the participation) between firm and customer are relatively high until the production process is reached. After this process, however, interactions are increasing once again, yet they are rather mediated through technology (see telematics system in Case D; remote maintenance software, Case C). This indicates lesser opportunities for firms to create value as direct interactions are rather absent. Therefore, firms must know the roles customers are likely to perform during the (earlier) solution process to not only simplify interactions but also to seize the right opportunities to create additional value. The advanced framework (Fig. 4) therefore helps firm managers to better understand and cope with role dynamics in co-created servitized solutions. Nevertheless, they remain dependent on customers' willingness to engage, as they must be invited by them first to be able to co-create value (Grönroos, 2011, Grönroos & Voima, 2013).

The second managerial implication this study brings forth is that adequate platforms to exchange information are utterly important to achieve an effective solution development. Against this backdrop, firms can ensure close collaborations and mutual commitment, which is deemed essential in collaborations. In addition, the findings of the study emphasize that maintaining a proper documentation throughout the solution process positively effectuates value creation (Tuli et al., 2007).

The third managerial implication of the findings is that the co-creation of servitized solutions requires a shift in corporate strategy and mindset (Baines et al., 2009). Cultivating an appropriate corporate culture to pursue and implement this strategy is therefore essential. Also, since employees are in direct contact with the customers, they should be well-informed and trained prior to collaborative engagements to be able to create additional value through interactions.

### **5.3. Limitations and suggestions for future research**

One major limitation of the study is related to the selection of cases. Although this multiple case study encompasses four cases with different contexts, a broader set of cases would be of advantage as it enhances variability and provides more insights into the topic of interest (Jaakkola & Hakanen, 2013). Nonetheless, this does not imply that larger samples necessarily increase the richness of data (Morse, 2000). Future studies could therefore replicate or extend the findings of this study. In addition, the pitfalls of qualitative study are largely the lack of the researcher's objectivity and the difficult assessment and demonstration of data rigidity (Skinner, Tagg & Holloway, 2000). To counter these drawbacks, the data were transcribed and member checked, which preceded the analysis.

Another limitation of this study is that it adopted a one-dimensional perspective on value creation in servitized solutions. Adopting a customer or dyadic perspective on value creation would broaden the overall understanding on value creation and perception in this particular research area. This enhanced understanding can then complement the framework by adding undiscovered value potentials.

Furthermore, the data indicated the important role of digitization. Since many firms have recognized the need to include technological advancements in their solutions, human-to-human interactions between the customer and the firm decline. A potential avenue for future research might be an investigation how to overcome this challenge, and how firms can exploit this opportunity to facilitate human-to-human interactions once again.

## **6. CONCLUSION**

The paper presented the different roles that are being adopted by firms and customers in the co-creation of servitized solutions. The underlying concept was value creation through interaction, while adopting a one-dimensional firm perspective. The discovered findings answer the research question: "*How can firms better make use of role dynamics in co-created servitized offerings?*".

First, the study presents empirical evidence that long-term relationships build the foundation for effective solution development between the firms and the customers across all cases. Mutual understanding, commitment and support, combined with open communication and the willingness to share information and resources are central aspects in servitized solutions. The findings also illustrate that many manufacturing firms recognized the important role of services, to both maintain and enhance customer relationships but also to generate additional revenue streams. They also serve as fundamentally important platforms to enter the value co-creation process, in which interactions are prominent.

Second, it has been recognized that within the joint solution process, customers and firms take on different roles to contribute to the overall value proposition. Firms act as value option advisers, value amplifiers, value process organizers, value experience supporters, value

demonstrators and value managers. The findings provide evidence that the firm roles are blurry and intertwined, are adopted based on previous experiences or expectations and are performed intuitively rather than systematically. Moreover, they are not restricted to a specific stage in the solution process, implying that they can occur iteratively and in different contexts. As interactions and close collaborations are prominent in the development of the servitized solution process, firms must strive to engage with the customers as early as possible to positively assert influence on the customers' value creation process. Usually, reciprocal interactions take place when the customers' approach the firms to ask for problem resolutions. In these instances, firms must anticipate measures to establish frequent interactions and dialogue as they are invited by the customer to co-create value with them.

Third, five strategies have been developed to help practitioners better make use of role dynamics in co-created servitized solutions. The data indicated that firms should 1) promote awareness, 2) formalize contractual agreements, 3) maintain a documentation, 4) incentivize successful collaborations and 5) place an expert to manage role dynamics efficiently. Implementing these strategies pave the way for more effective value creation through a complementary alignment of activities and value expectations.

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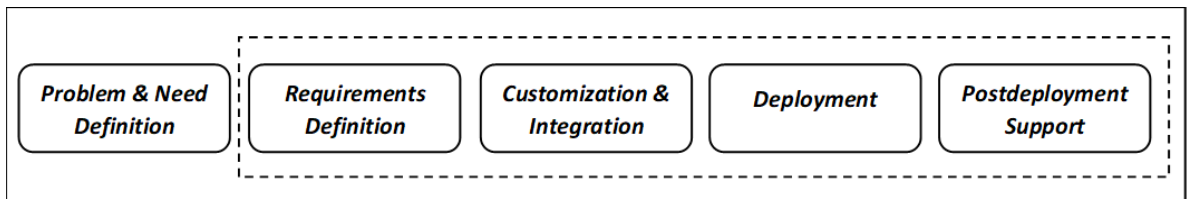


## 9. APPENDICES

### Interview Sheet

1. Please describe what your company offers and in which industry you are operating in.
2. How many employees does your company have?
3. Please describe your position in the company and the roles and responsibilities that you have.
4. Are you operating in the b2b, b2c or b2g environment?
  - B2B, if so: *How would you describe the relationship with your customers, as rather:*
    - *Short-term, or*
    - *Long-term*
  - B2C
  - B2G
5. Do you sell products, services or also combinations of both?
  - a. Is your company rather product or service oriented when it comes to sales?
  - b. Which services does your company offer that supplement your products? (for example: installation, maintenance/repair or availability services such as predictive maintenance?)
  - c. Do you customize the products for your customers?
    - i. Can you also customize the services?
6. Could you describe how important services in your company are? How do you view the role of the services that you offer?
  - a. In your opinion, did you recognize a significant change over the last years towards a higher demand of services from your customers?
    - Yes
      - So, did you eventually include more services to your portfolio? Yes/No
      - Was this a deliberate strategy or did it happen in a rather *emerging/stepwise* fashion that you included more services to your offerings?
        - Have you rearranged the company structure and some processes to accomplish this? (adding of service department?)
        - What do you think was the influence of the customer on pursuing this strategy?
    - No
7. Do you develop offerings or solutions with your customers together?
  - Yes/ No
    - If yes: How do you make this possible?
    - Do you have an example of a service (product) in which you have collaborated with a business customer?
8. Could you briefly explain the reasons/motives why you include your business customers in the development of solutions?
9. What prompts/encourages your customers to approach and work with you?
  - a. What are the features/attributes you have when you interact with them?
10. Describe how you create value for your customer when you jointly work on a solution // What do you think are the main tasks you have to undertake when you work together on an offering/solution? (*organize the processes, amplify value creation through contributing specialist knowledge and expertise, advisor of the options, give support through experience*)

- a. What do you think are the main tasks of the customers? (*co-diagnoser of the problem, co-producer, co-developer, co-designer, co-promoter, co-producer*)
- 11. When you work together: do you predefine who takes over which tasks and responsibilities? For example: you take over activity X, the customer takes over activity Z? During and after the solution process?
  - i. If so: Do you formalise this by contracts?
- 12. Which resources do you (as a firm) bring into the collaboration? Which resources does the customer usually bring with? → *Resources are not necessarily physical assets but also knowledge or skills, etc.*
- 13. How do you enable a good and stable communication dialogue with your customer?
- 14. Is there only one contact person accompanying the customer or can it be more?
  - a. Which departments are usually involved in the the solution process?
    - i. Do they share critical customer information?
  - b. Do you document the collaboration with your customer? Like the outcomes, the activities performed, or roles taken over? → In order to be better prepared for the next time?
  - c. Do you try to standardise the solutions/offerings later so that extra sales can be generated?
    - i. Do you inform the customers over the next steps each time?
- 15. Regarding the customers you are collaborating with, are these customers with high expertise only?
- 16. What do you think are risks of this co-development? (→ share of critical and sensitive information?)
  - a. Do you have a practical example that demonstrates the risks and challenges of a co-development?
- 17. Literature portrays customer solutions as a five-stage process. Do you agree with the defined solution process?

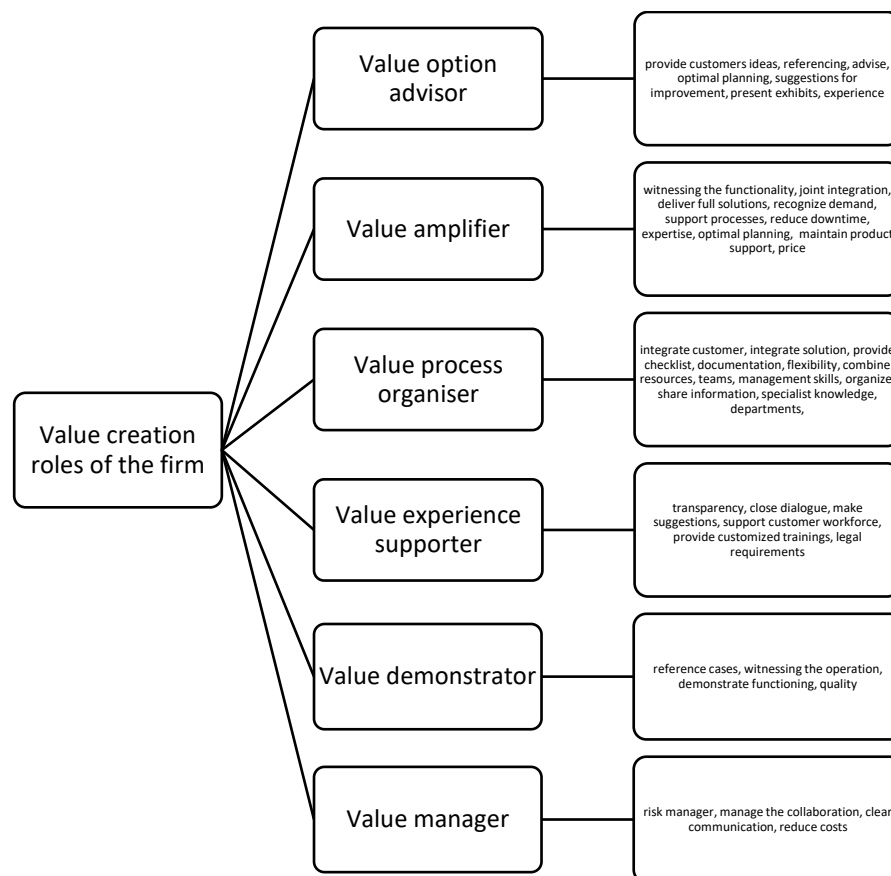


- a) Imagine that a long-time customer of yours is having a certain problem and is approaching you with this. How do you usually interact with your customer in this kind of scenario?
  - a. How do you find out what the customer really needs?
  - b. Based on your experience, would you say that the customer is in most of the cases aware of what his problem and need is? What do you do to find this out?
- b) Imagine that the problem and need of the customer has been determined. The next step is to determine the specific requirements the customer has for the product offering. How does the collaboration with the customer look like in your company?
- c) Step 1 and Step 2 have been completed, information have been exchanged and you are ready to design the customized product or service offering, integrate and modify the parts needed. In this production process, what do you think is your role to make the product/service solution work?
  - a. Is the customer involved in this phase, too? Or does the customer help you here in any way? With his resources, market and product information, skills?
- d) Imagine that you have produced a customized product for your customer, and you are about to deliver and install it at the customer's site. What is your main activity here and what do you do to satisfy the customer?
  - a. Do you provide trainings for your products?

- b. Does it often happen that the customer changes his expectations, requirements or interests when you develop the desired customer solutions?
  - c. Do you ask for information of your customer to understand the workforces' skills and capabilities?
- e) The last step in the solution process is comparable to the after-sales services that company's offer. As you have heard before, there are different types of services: base (installation) services, intermediate (maintenance) services and advanced (predictive maintenance, availability) services. After you have sold your products to a customer, which types of services do you usually sell?
- a. Do you also sell maintenance contracts?
  - b. How do you make it possible that your customers like the service that you offer?
  - c. How do you include the customers in your services? What is your role and what is theirs?
18. Are you aware that you are taking over different value creating roles when you co-develop solutions?
- a. Could you give me an explanation why an awareness of these roles would be important for the company?

**Coding Scheme**

*Aggregate Dimension                      1<sup>st</sup> Order Analysis                      2<sup>nd</sup> Order Analysis*



**Figure 5:** *Coding Scheme for Value Creation Roles of Firms*

**Table on Value Creation Activities per Case**

Case A	Case B	Case C	Case D
<p><b>Problem and need definition</b></p> <ul style="list-style-type: none"> <li>•“Together, we discuss what the customer really needs. We can give the customer ideas [based on former solutions]”</li> <li>• “these things are probably not the expertise of the customer, but this is ours”.</li> </ul>	<p><b>Problem and need definition</b></p> <ul style="list-style-type: none"> <li>•”most of the time the customer states his problem, then we work in collaboration on it, we dig into the problem together, we have teams for it</li> <li>•”you need training and experience to know what the customer’s problems and needs are”</li> </ul>	<p><b>Problem and need definition</b></p> <ul style="list-style-type: none"> <li>•”we come to the customer, discuss his problem, and we provide him ideas for solutions which are realizable”</li> <li>•”we look for solutions that reduce his and our costs”</li> <li>•”question-answer game”</li> </ul>	<p><b>Problem and need definition</b></p> <ul style="list-style-type: none"> <li>•”together, we try to fix that problem and try to gather ideas to make it possible. That depends on the background of the problem.”</li> <li>•”you search for a possibility to alter the machines based on the customers’ needs”</li> </ul>
<p><b>Requirements Definition</b></p> <ul style="list-style-type: none"> <li>•“you can look at customer solutions made before, and we can give the customer ideas based on that”</li> <li>•”with our experience, we take over the role as a technical expert [...] when we discuss specifications”</li> </ul>	<p><b>Requirements Definition</b></p> <ul style="list-style-type: none"> <li>•”most of the time, there is already an extensive set of requirements worked out, and written down in contracts</li> <li>•”we have combined development teams”</li> </ul>	<p><b>Requirements Definition</b></p> <ul style="list-style-type: none"> <li>•”we provide a checklist at hand what is needed”</li> <li>•”together, we develop a technical drawing of the machine”</li> <li>•”we try to present possibilities that can work”</li> <li>•”we show exhibition piece</li> </ul>	<p><b>Requirements Definition</b></p> <ul style="list-style-type: none"> <li>•”long-term relationships help us to know our customers and their industry better, so we can better suggest solutions”</li> <li>•”our [technical] specialists discuss it with the customer, they call him, email him.”</li> </ul>
<p><b>Customization and integration</b></p> <ul style="list-style-type: none"> <li>•”we produce a product that is quite closely tailored to his needs”</li> <li>•”we try to involve the drivers, not the purchasers”</li> </ul>	<p><b>Customization and integration</b></p> <ul style="list-style-type: none"> <li>•”what we do is especially the integration of the product(s) into the solution. Not just delivering, but after installing, taking care that the product is working”</li> <li>•”there are moments in the design in which we do critical reviews together”</li> </ul>	<p><b>Customization and integration</b></p> <ul style="list-style-type: none"> <li>•”if we face regulations and restrictions, we inform ourselves, get acquainted with it, and customize the solution as good as possible”</li> <li>•”a few customers say: we produce this part ourselves, or take care of a certain process. We let them do. We integrate it in our process.”</li> </ul>	<p><b>Customization and integration</b></p> <ul style="list-style-type: none"> <li>•”That [machine] is completely rebuilt by us ... It now has a totally different function; you cannot find it directly sold by suppliers. We altered it completely.”</li> <li>•”you ask the customer to come over, look at all specifications, the design, the single parts. We integrate it.”</li> </ul>
<p><b>Deployment</b></p> <ul style="list-style-type: none"> <li>•”the customer gets the vehicle, the equipment and he can start using it”</li> <li>•”we are open to feedback when we deliver the product, and we change things or details when the customer does not like it”</li> </ul>	<p><b>Deployment</b></p> <ul style="list-style-type: none"> <li>•”in a three-stage process, the customer is witnessing the functioning of the product”</li> <li>•”we do a setup, recognize that he has a demand for this, this and that, and we deliver it later as well”</li> </ul>	<p><b>Deployment</b></p> <ul style="list-style-type: none"> <li>•”optimal planning is key. Before we deliver it, we call the customer to ensure that preconditions are met. Experience taught us so.”</li> <li>•”we take over the tasks the customer cannot perform”</li> </ul>	<p><b>Deployment</b></p> <ul style="list-style-type: none"> <li>•”we have to ensure that the product functions, especially after we have delivered it, and see if it needs smaller alterations.”</li> <li>•”we send our mechanic to him to align it with his needs and his environment”</li> </ul>
<p><b>Postdeployment Support</b></p> <ul style="list-style-type: none"> <li>•“we give instructions, provide trainings and some kind of documentation”</li> <li>•“we give confidence in the way that we provide service and support so that they have their equipment rolling 24 hours a day”</li> </ul>	<p><b>Postdeployment Support</b></p> <ul style="list-style-type: none"> <li>• “when you design a training, you do kind of a “training-needs-analysis”. You should know what the skills of the customer workforce are”</li> <li>•”we organize the complete operational availability”</li> </ul>	<p><b>Postdeployment Support</b></p> <ul style="list-style-type: none"> <li>•”we give advice to the customer [...]. Knowledge is crucial for ongoing support”</li> <li>•”flexibility helps us [...] when it comes to services. We are available 24/7, have night express, immediate telephone support</li> </ul>	<p><b>Postdeployment Support</b></p> <ul style="list-style-type: none"> <li>•”we have to align [the need of the customer] with the functions and products, match the right services and perform the services on a continuous basis to reduce machine downtimes.”</li> <li>•”we optimize the settings of the machine”</li> </ul>

**Table 2:** Examples of value creation activities adopted by firms in servitized solutions