Servitization for consumer products

an empirical exploration of challenges and benefits for supply chain partners

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**Servitization for consumer products: An empirical
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Servitization for consumer products: An empirical exploration of challenges and benefits for supply chain partners

Abstract

Purpose: To increase sustainability of their products and enable new business opportunities, manufacturers explore servitization in consumer markets. Yet, the literature has not addressed this development. This study is one of the first to investigate the challenges and benefits for manufacturers and their supply chains when engaging in Business-to-Consumer (B2C) servitization.

Methodology: The study explores two unique cases of manufacturers of complex consumer products that aim to extend their service offerings to the end-users. Data were collected via semi-structured interviews, observations and secondary data.

Findings: First, we identify two factors as prerequisites for a servitized set-up: internal collaboration within the manufacturer and product characteristics (e.g. product complexity). Second, we identify the network as an important factor for B2C servitization, which includes the triadic set-up between manufacturer, installer and consumer. Third, we identify moderating institutional settings, such as regulations and consumer needs.

Originality: This research elaborates existing B2B servitization theory into an empirically informed theoretical framework for B2C contexts. It expands the view on servitization by introducing the network perspective to service a large number of geographically dispersed customers.

Keywords: Servitization; case study; consumer products; business to consumer, triads, circular economy, sustainability

1. Introduction

Manufacturers of complex consumer products, such as user electronics or air conditioners, face novel challenges due to consumer demands for additional service, extended product warranty, and changing sustainability legislation. A recent study by the European Commission (EC) highlights indeed an increasing need and wish of consumers to extend product life cycles through repairing and service provision (EC, 2018; Montalvo et al., 2016). Pressure on companies further increases through related, already implemented European directives, such as the Waste Electrical and Electronic Equipment (WEEE) Directive (EC, 2012). Taken together these drive manufacturers to investigate the potential for servitization in a Business-to-Consumer (B2C) context in order to be able to repair, exchange and take back manufactured products from customers with important implications for the delivery chain and the nature of their products. The present study aims to investigate these managerial challenges, suggested solutions and consequences.

The servitization literature has remained silent regarding the above challenges, with a predominant emphasis on Business-to-Business (B2B) settings (Baines et al., 2017; Kastalli and Van Looy, 2013; Vandermerwe and Rada, 1988). The limited studies on B2C servitization (Kook et al., 2020; Mahut et al., 2017; Opresnik and Taisch, 2015) have ignored specific characteristics such as the need for geographically dispersed service facilities (Chase and Apte, 2007), the complexity of consumer interactions (Halldórsson et al., 2019), or the involvement of multiple partners in a service network (Ayala et al., 2017; Zhou et al., 2020). Consequently, research has also not addressed, for example, triadic set-ups involving intermediaries that sell, install and serve customers, with limited contact between manufacturer and customers. Taken together, despite an increasing societal need, the effects of these considerable differences between B2C and B2B contexts are not well

understood nor investigated. This is the gap the present study aims to fill. Our main research question is:

What are the challenges and benefits for manufacturers and their supply chains when engaging in servitization for their consumer products?

Through this work, we provide preliminary insights into B2C servitization, its managerial challenges and solutions as well as supply chain consequences. Based on an initial conceptual framework rooted in the existing B2B servitization and service operations literature, we empirically build our paper on two cases in two large companies, who are first movers into this new area of servitization and aim at extending their services for consumers. The cases provide insights into a number of different products based on dissimilar technologies. The findings show the multitude of managerial concerns in B2C settings, including the need to create, manage and govern a servitization network between manufacturers, installers and consumers. Blended with our theoretical base, we use these to develop implications and suggestions to extend the field of B2C servitization.

This research extends the servitization literature to the B2C context, showing the distinct supply chain implications. Here, the identification and linking of four emerging constructs - internal collaboration, product characteristics, network and institutional settings - enables substantial elaboration of existing understanding. As most existing studies on servitization have focused on B2B contexts, this research establishes an empirically informed theoretical framework (Kivunja, 2018) as a first step to towards theory on B2C servitization. This research expands our view on servitization, going beyond the original idea of close service dyads with few customers (Vandermerwe and Rada, 1988; Wise and Baumgartner, 1999) by adding the network perspective to service large numbers of geographically dispersed customers.

This research has important implications for managerial practice and public policy as their decisions can enable or restrict B2C servitization. Managers need to take a broad perspective by more systemic evaluations of their actions, related to both cross-disciplinary collaboration within the manufacturer (to enable service-focused product design and internal operations) as well as the supply chain around them. While this consideration is emerging in the B2B servitization literature (e.g. Raddats et al., 2019), our research shows that these considerations are even more important determinants for B2C servitization. In addition, our findings show that policy makers shape part of the institutional context that either enables or hinders the potential for B2C servitization and the associated sustainability of consumer products. Our findings show that existing and future policies form strong incentives for the decisions made by manufacturers, installers and (to a lesser degree) consumers. Policy makers can use our insights to draft a thoughtful combination of regulations that not only enable and encourage servicing and recycling of consumer products but also regulate the wider legal implications in terms of product life cycle, including product warranty and legal liability for failures.

2. Literature review

We base this study on existing literature on servitization, which has focused on Business-to-Business (B2B) settings (Section 2.1). We discuss how these may apply to the Business-to-Consumer (B2C) setting (Section 2.2) and develop a conceptual framework for our empirical analysis (Section 2.3).

2.1 Servitization

Servitization describes the strategy of manufacturing firms to “offer fuller market packages

or bundles of customer-focused combinations of goods, services, support, self-service, and knowledge" (Vandermerwe and Rada, 1988, p. 314), which support the product's life cycle (Kastalli and Van Looy, 2013). Servitization has predominantly focused on manufacturing companies' change of offerings towards the application of technology-based expertise, skills and competencies to solve buyer problems (Schmenner, 2009; Zhang et al., 2016). Servitization requires integrated Business-to-Business (B2B) relationships, usually in a dyadic set-up (Kreye, 2017; Raddats et al., 2017) with **benefits and costs** for both provider and buyer. Providers stand to receive higher profit margins with more stable and long-term predictable cash flows (Wise and Baumgartner, 1999), and increasing competitiveness through buyer lock-in (Schmenner, 2009). Buyers stand to reduce the operational costs of equipment by outsourcing maintenance activities and focusing on core activities (Akkermans et al., 2019; Wise and Baumgartner, 1999), along with optimised buyer operations through providers' technical expertise (Kastalli and Van Looy, 2013).

The servitization literature (Baines et al., 2017; Raddats et al., 2019; Sousa and da Silveira, 2017) stresses a need to **change operations** of the providers from traditional product-based processes to processes able to deal with customer inputs for service provision (Kreye, 2017; Raddats et al., 2017). As a result, servitized manufacturers need to manage an increased information flow, ensuring that relevant information, such as the equipment's condition, is available at the right time. This makes internal communications and information management one of the additional tasks for servitized manufacturers.

Finally, the changed business **relationships** between provider and customer need **governance**: i.e. appropriate coordination and control mechanisms (Bastl et al., 2019). To coordinate B2B service relationships, providers often rely on relational coordination mechanisms (Selviaridis and Norrman, 2014) due to the long-term and close relationships

with the customer (Raddats et al., 2017; Vargo and Lusch, 2008). These relationships include a series of exchanges and planned and administered transactions (Tax et al., 2013), increasing predictability and reducing uncertainty for both partners (Kreye, 2017). Such relational governance is further strengthened by multiple contact points between partners (Grönroos, 2011; Sampson and Spring, 2012): both personal (service engineers repairing or maintaining the product, (Kreye et al., 2015) and impersonal interaction (e.g. digital monitoring technology or remote operation, (Larivière et al., 2017).

2.2 Applying servitization to B2C

There are differences between B2B and B2C services (Kreye et al., 2018; Tax et al., 2013), which likely prohibit simply transplanting the above discussed insights from B2B to the B2C context. B2C services can be characterised through (1) a large number of geographically dispersed service facilities (Chase and Apte, 2007); (2) consumer interactions span both transaction-based (one-off) and relationship-based (planned and administered) service encounters (Tax et al., 2013); and (3) less complex interactions between provider and consumer based on singular channels of contact (Halldórsson et al., 2019). These characteristics of consumer services result potentially in changes to servitization in this setting. For example, the large, geographically dispersed customer base requires a large number of front-line employees (Zhang et al., 2015) and prevents the manufacturer to act and service customers directly, implying the need for a triadic network for B2C servitization, where an intermediate, the installer, provides the front-line service (Finne and Holmström, 2013). Below, we further assess and contextualize the three main areas of attention: distribution of benefits and costs, distribution of operational tasks, and relational governance based on these differences to B2B servitization.

The ***distribution of benefits and costs*** needs to be considered in B2C. While provider benefits may be similar in a B2C setting as in B2B, the benefits to consumers will differ. Instead of the economic benefits predominantly described for buyers in B2B servitization, consumer motivation may stem from increased life expectancy of engineered products and hence reduced environmental impact, as evidenced by a recent study by the European Commission (EC, 2018). In addition, adding intermediaries required to service a large number of consumers adds a third partner, creating a service triad. Service triads are defined as a collaboration, where a buyer contracts a supplier to deliver – part of – a service directly to a buyer (Wynstra et al., 2015). The distribution of benefits and costs in the triad will likely be different from B2B, typically dyadic settings.

Similarly and related, the ***distribution of operational tasks*** requires reconsideration in B2C settings, stemming particularly from the likely more complex set-up of operations in a service triad. Many of the customer-contact activities are usually handled by an installer, who effectively acts as the direct service provider in the triad (Wynstra et al., 2015). The service triad literature has also predominantly focused on business settings and specifically on the manufacturer's role in managing the relationships (Karatzas et al., 2016; Wynstra et al., 2015). While in these business settings, manufacturers have an important integrator role (Ramirez Hernandez and Kreye, 2021), this role will differ in B2C settings because installers are the predominant customer contact point. Therefore, the distribution of operational tasks among manufacturer, installer and consumer in B2C servitization needs to be considered.

The B2C servitization context also affects ***relationship governance***. In most B2C services, front-line employees such as restaurant waiters (Schaarschmidt and Höber, 2017) or hotel receptionists (Zhang et al., 2015) often are a predominant contact point for service

sales and delivery (Kreye et al., 2015; Sampson and Spring, 2012). B2C relationships can have a transactional character, which is focused on the individual service engagement, or a relational character, which is based on long-term relationships (Tax et al., 2013). In other words, consumer services vary in terms of the relationship characteristics. This and the effects of actions by a potential third party in case of a triadic setting (Hartmann and Herb, 2015; Modi et al., 2015) might affect relationships and their governance in B2C servitization, which may require a mix of relational and formal coordination and control approaches.

2.3 Conceptual basis for B2C servitization

Based on the discussions above, three concepts emerge as the conceptual basis for investigating our research question. First, division of ***benefits and costs*** have been described as central prerequisite for servitization (Vandermerwe and Rada, 1988; Wise and Baumgartner, 1999). For B2C settings, this would include not only the benefits and costs of the manufacturer and customer (Vandermerwe and Rada, 1988; Wise and Baumgartner, 1999), but also of potential additional actors in the supply chain, such as the installer (Finne and Holmström, 2013). Second, in a B2B setting the core is to decide on which division of ***operational tasks*** the manufacturer will perform (Bustinza et al., 2019; Rabetino et al., 2018; Zhang and Banerji, 2017). It seems that given the geographical dispersion of customers and the triadic setting, the division of additional tasks is of interest in the B2C setting, as more options emerge. Third, our discussion also pointed at ***relationship governance*** (Sampson and Spring, 2012) through coordination and control (Bastl et al., 2019). The wide variation of relationships in consumer settings and the need for a triadic set-up with installers as the service providers create a particularly wide range of potential relationship governance arrangements in B2C servitization. In addition to these three

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concepts, we explore the effects of – or changes in - **context** in our analysis as a fourth concept. The reason for this is partly motivated because regulations play a role, as indicated in our introduction and partly because contingencies and context affect in many supply chain management related efforts (e.g. Giménez et al., 2012) often at different levels (Flynn et al., 2016). This includes factors, such as higher regulation in case of consumer products and their functioning, including warranty periods and liability (Karatzas et al., 2016; Valtakoski and Witell, 2018). We acknowledge that these contextual factors can influence the ability or need to servitize and its configuration (Reim et al., 2019). Table I presents an overview of these identified concepts that are the foundation for our empirical investigation.

<Please insert Table I about here>

3. Methodology

This study aims to build the theoretical foundations for the field of B2C servitization. As we base much of our insights on existing theory in B2B servitization (Section 2), which we aim to extend to a novel context of B2C, we position this research as theory elaborating (Fisher and Aguinis, 2017). Theory elaboration is understood as *“the process of conceptualizing and executing empirical research using pre-existing conceptual ideas or a preliminary model as a basis for developing new theoretical insights by contrasting, specifying, or structuring theoretical constructs and relations to account for and explain empirical observations”* (Fisher and Aguinis, 2017, p. 441). A qualitative approach via case studies is a suitable method for theory elaboration (Ketokivi and Choi, 2014). Case studies offer rich data that enable an in-depth analysis of the studied phenomenon as well as identifying contextual influences (Voss et al., 2002; Yin, 2018), fitting our research aims.

3.1 Case selection

We present insights from two empirical case studies to enable contrasting observations “across different contexts” (Fisher and Aguinis, 2017, p. 445). In fact, novelty is such that currently only few organizations extend servitization strategies to consumer products as of market trends and regulatory pressures in this area are relatively recent (EC, 2018; Montalvo et al., 2016). Therefore our case selection is mainly based on unique or atypical cases (Voss et al., 2002), being organisations that consider or started efforts into B2C servitization. Given the strategic nature of such efforts, case selection was based on existing and established contacts with organizations and as such opportunistic because we found it impossible to sample the potential population systematically for this emerging field of practical concern. In contrast to conventions in complex consumer product industries, the two case companies explored new strategic choices in the form of B2C servitization, providing unique possibilities for theory elaboration. Case A fitted our purpose as it offered different types of heating equipment in consumer homes and apartments blocks. Case B fitted as being a manufacturing company operating in the water supply sector, providing products and appliances for water treatment. Many of these products and appliances are part of an installed base in private homes and blocks of flats. Both cases fitted our theoretical setting and conceptualisation as both produce consumer products where existing and developing regulations point towards a more service-oriented set-up, such as the WEEE framework for consumer electronics or warranty demands (EC, 2012). Additionally, to facilitate comparison, the cases have similar products, as they require relatively little direct consumer interaction during normal operations. Finally, both cases were at the initial stage of considering and investigating implementation of a B2C servitization strategy. At the same time, the cases offer differences in some potentially

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important factors, such as the technologies, delivery strategy and institutional environment at large. Together these support the theory-elaborating nature of this research, mitigating the possible detrimental effects of our case study selection.

3.2 Data collection

The data were collected from multiple sources of evidence (Yin, 2018). The researchers had ongoing, long-term collaborations with both case companies focusing on their existing business strategy and operations in servitization. Initially, senior managers were interviewed before later directly involved senior managers and operational respondents were included in our data collection. The core of our data were 29 semi-structured interviews with employees and senior managers in different functional fields, as well as installers, and consumers across the two cases (Table II). Interviewees were selected as being knowledgeable as is clear from their senior positions and/or performed and monitored tasks directly related to technical and service tasks for the chosen product and its context (Gibbert and Ruigrok, 2010). Others were also referred to as relevant and knowledgeable informants (snowballing). An interview guide was developed iteratively with respondents as case-specific understanding emerged. Initially, open questions explored the interviewees' view on opportunities and challenges for B2C servitization, as well as existing management capabilities in the case organisation. These discussions enabled an initial understanding of the potential for B2C servitization in the case companies and initially offered a more open approach to data collection. This initially inductive approach was deliberately chosen despite the theory-elaborating nature of this research to ensure suitability of the selected cases and enable the researchers to capture potentially new issues beyond the conceptual framework. Eventually, a more structured approach based on the conceptual framework

(Table I) ensured that theoretically identified concepts were included in the interviews through probing. This offered comparability between interviewees and cases (Yin, 2018). The Appendix shows the final list of questions and topics discussed in the interviews. Interviews varied between 30 and 90 minutes in length. In addition, observations at the company sites and collected secondary data (including company meetings, regulation documents, and company memos and reports) complemented the in-depth insights by providing important background information and sources for confirming insights from the interviews.

<Please insert Table II about here>

3.3 Data analysis

Data were analysed using qualitative coding through thematic analysis to provide rigorous and consistent insights across the empirical data, enabling connection between theoretically and empirically derived concepts (Miles et al., 2014; Yin, 2018). Specifically, we used a two-step process. First, within-case analysis focused on each individual case to understand its specific dynamics and challenges. We combined deductive and inductive elements fitting our theory elaboration aim. We started data reduction to identify first-order themes firmly rooted within the case evidence. Subsequently, these themes were clustered deductively based on the conceptual framework (Table I). In doing so, we detected that some first-order themes could not be interpreted or associated with any of the existing theoretical, a priori categories. Hence, we clustered these into newly emerging aggregate themes, such as product complexity and internal collaboration. At the same time, our data did not show any evidence for the relevance of the division of operational tasks, which therefore was excluded from further analysis. Due to the specific triadic set-up of B2C servitization, our

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findings suggest that the division of tasks does not change substantially as front-line services are still provided by intermediaries. Based on this process, we identified four aggregate themes – product characteristics, internal collaboration, network, and institutional settings. In order to further validate our findings we obtained feedback in presenting initial conclusions to the individual case companies, which further enhanced our understanding. Table III provides insights into our coding structure, including example quotes, first-order and aggregate themes.

<Please insert Table III about here>

Second, the cross-case comparison enabled contrasting of insights between both cases. Here, the case-specific insights regarding the four aggregate themes were compared, showing similarities and differences between them. This provided insights regarding the nuances of the four aggregate themes identified in the within-case analysis for further conceptual development and theory development (Welch et al., 2011). Figure 1 shows how first-order themes were combined into aggregate themes based on our abductive approach, making explicit where existing theoretical constructs from our initial conceptualization (Table I) were employed.

<Please insert Figure 1 about here>

4. Findings

This section presents the within-case analysis of both cases. Comparison between these insights is included in the discussion.

4.1 Case A

Case context: Case A was part of a large multi-national company operating in a diversity of

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3 markets in terms of geography, products and technologies. Case Company A's products
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5 were sold through and installed by independent installers, who also sold and installed
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7 similar competitor products. These installers provided advice and often maintenance and
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9 repair services throughout the product's lifecycle. Case Company A provided technical
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11 support and advice to these installers, as well as service parts if needed. On average,
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13 products needed replacement after 15-20 years. Setting up a service network themselves
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15 would not only be a major investment given the size of the consumer base, but building
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17 such a network would potentially destroy the existing relationship with installers, that
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19 played an important role in consumers' buying decisions. Still, warranty and reputation and
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21 the difficulty to quickly detect systematic failures in delivered and installed products, and
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23 the wish to have in-depth insights into the product use, made Case Company A decide to
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25 explore options for servitization in a triadic setting. Finally, there is also a believe that
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27 customers would like to have more direct contact with the manufacturer and that markets
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29 change, as *'Customers like to be able to get objective advice, but this is not available enough*
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31 *via installers. That is when customers start to search online and contact the producers of the*
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33 *heating devices themselves'* (Director Sales Operations).
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42 **Product characteristics:** Standard products had been produced for 30 years with
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44 little further (fundamental) innovation possible. A new line of products, which were more
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46 complex and technologically advanced, was developed driven by changes in energy usage
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48 and was now gaining market share. The new products had some fundamental different
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50 properties, requiring specific knowledge and capabilities: *'When products become more*
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52 *complex, knowledge about it becomes increasingly valuable'* (Sales Manager) as well as
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54 *'These [Innovative products] and the installation thereof create a need for knowhow'*
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59 (Director Installer). These new products offered increased options for monitoring products
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in use at the consumer's site. These new products would help the installer to provide a better service to the consumer, get access to a new promising market and at the same time extend the service offering to the consumer by providing maintenance and additional services. Servitization would be easier for the newer and more complex products where an extended service offering is more valued. In other words, product characteristics determined whether B2C servitization was possible in Case A, as also the Director Installer realized: *'parties ought to think differently'*.

Internal collaboration: Interestingly, there was also a major issue internally for the manufacturer to be able to manage and control or even realize servitization. As the Sales Manager Commercial Heating noticed, *'There has to be a culture change for the services that are added and adjusted to fully integrate'*. Similarly, the Director of Sales Operations pointed out that *'We need to change our culture, since we are familiar with selling products, and we need to start focusing on service and selling a promise'*. This would also enable Case Company A to control service quality in the product usage. *'We want to control the first use of [these products], to make sure that it is installed well'* (Sales Manager Commercial Heating). This would additionally enable Case company A to control the extended legal liability to some extent.

Network: A servitized network would require collaboration with installers, who would continue to be responsible for installing and maintenance/repair. As the Director Product Management voiced: *'We have to be careful in not messing up our collaboration with installers, when we choose to servitize'*. The required involvement of and cooperation with the installers was seen as one of the main challenges for the (current) mature products and markets, as the Director Product Management said *'When tasks and relationships change due to servitization, I think it is important to inform and involve the installers that*

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3 you want to work with'. The Director Installer mirrored this view as follows: *'You cannot*
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5 *circumvent some installers to feel like their tasks have been stolen'*. Redistributing tasks
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7 would be challenging, there would be a need to either by-pass existing relationships
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9 between consumer and installer or shape cooperation in a mutual beneficial way. Given the
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11 novelty and some new tasks, this would be easier for the new products, where installers
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13 would receive support from the manufacturer as the manufacturer could take care of
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15 regulations ensuring safety and help installers *'... in being certified to sell [these products]*
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17 *and perform trainings that teach installers how to install them'* (Sales Manager).
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23 In a product-based set-up, the installers had a pure transactional relationship with
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25 the manufacturer, while they generally had a more service-related, long-term relationship
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27 with the consumers. Still, frequency of interaction was limited. However, moving into
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29 servitization offered installers direct association with the manufacturer. Consumers
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31 acknowledged that they would like the installer to be more connected to the brand and
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33 reputation of the manufacturer. The Director of Sales Operations explained: *'Our name*
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35 *makes that a lot of installers are possibly willing to collaborate with us, as it is a trusted*
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37 *brand which the customers like'*. The installer might also benefit from the back-up and
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39 technical support of the manufacturer, which would give better access to consumers and
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41 enable to offer a better product and service, while the consumer might have more trust and
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43 certainties in a triadic service arrangement and installed product: *'When [Company A] uses*
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45 *pre-selected installers, I would trust the installers more'* (Customer). All in all, in terms of
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47 costs and benefits, the aim to *'create a relationship where we and the installers are both*
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49 *feeling like we will benefit from a new servitized situation.'* (Director Sales Operations) was
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51 possible. In addition, the manufacturer aimed to influence the installers to recommend their
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53 products to the consumer and support them with technical advice. This means that the
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relationship between manufacturer and installer would become tighter in a servitized set-up for the novel and complex products, i.e. become '*partners that are willing to work on behalf of [Company A]*' (Director Installer). Here, the installers' motivations in terms of the expected advantages of an association with the manufacturer's brand would create a strong driver towards the creation of the closer relationships. This type of relationship would create dependencies for the installer, but also options as it provided better market access and builds up knowledge.

The more intense contacts between the parties and specifically between the installer and the manufacturer required additional mutual investment between the manufacturer and the installer in terms of training: '*Installers can only install our [new products] if they followed a training at [Company A]*' (Director Product Management). Additionally, the manufacturer could assume the legal responsibility and responsibility for required certification for the installation of the product, providing a source of income: '*The regulation ... is a typical example of a service that can be capitalized*' (Sales Manager). Even without a formal contract, such involvement of the manufacturer might feel for the consumer as a direct relationship with the manufacturer: '*Licenses and a guarantee of installer's knowledge gives trust*' (Customer). In addition, some installers would acquire a different status as being a selected installer, which could improve their competitive advantage on the market.

Institutional settings: Interestingly, the company strongly assumed consumers would welcome additional services from the manufacturer (or others) as '*We move towards selling less of a product; it is more and more about the services that are attached to the product*' (Director Sales Operations). In other words, consumers' changing requirements for more services created a strong driver for servitization in Case A. In addition, also the

certification of the product was of importance *'we are certified to handle any aspect of it, which is a service for our customer'* (Director Sales Operations) and would limit liability issues or claims. Finally, closer involvement of the manufacturer would also help to prevent failures to happen that would be seen as dangerous, leading to reputational losses.

4.2 Case B

Case context: Case Company B's main motivation for servitization was increased sustainability and competitiveness. The Senior Director of Technology Product manufacturer explained, *'we can differentiate ourselves from our competitors with [having] the least impact on the environment. And this is all about takeback systems, reuse and repairability.'* While their existing approach was to outsource the disposal of old units and materials, which was required by existing regulations (WEEE guideline), they now aimed at actively driving sustainability through a servitized set-up. Here, they had already improved material use for their products with their supply chain. Servitization would offer the opportunity to work with partners downstream to increase environmental sustainability.

Product characteristics: B2C servitization required change of the product designs to enable service. Case company B needed to integrate the installer's wishes into their products and servitization promises. The Senior Product Line manager summarised this as follows: *'What is it that really gives him benefit? It can be that it is easy to store, easy to order or to have components cover many applications so he does not have much in stock.'* Case company B put the starting point at the product design as the Head of Technical Innovation manufacturer explained: *'if you need repair on site, it [the service] takes too long in relation to the downtime and the number of hours an installer is going to do. Then there are also some considerations about how to scrap it.'* As a result, installers currently just

replaced the whole product. For a more sustainable service-based set-up, the installer needed to be able to service the product quickly and repair or replace individual components. Current products saw limited serviceability due to the importance of reliability as the Senior Marketing Manager explained: *'All electronics are completely molded into plastic, which makes it completely impossible to disassemble afterwards. It is hard to get a clean plastic part and a clean core or electronics part.'* Additionally, increasing serviceability *'... means that you have a platform for some solutions that you use across the products. So a little more modular'* (Director of Product Compliance). By enabling the exchange of components rather than whole systems and standardising the components, services could be provided quickly and cost effectively and replaced components (and products at their end-of life) could be returned to Case Company B for disassembly and remanufacturing. The assumption was that if enabled through appropriate product designs, installers would be able to repair products more frequently and collaborate with the remainder of the network for servitization and increasing environmental sustainability.

Internal collaboration: A servitized set-up required a different management approach and internal changes from Case Company B as the Director Product Compliance explained: *'I very much see this circular economy theme as super interdisciplinary, i.e. really across the whole company. It requires something to involve the right places at the right times, we really need to be good at working on this.'* In other words, B2C servitization required Case company A's different departments to share information and integrate their processes much more seamlessly.

Network: In a product-based set-up, Case company B was part of a supply chain that included wholesalers or system manufacturer s, who then sold the product (or physical system) to installers. The installers distributed them along with competitor products to

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3 consumers, which involved installing the chosen product into private homes and servicing it
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5 when needed. In other words, installers were the front-line service providers. In a servitized
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7 set-up, installers were still required as the Senior Service Manager explained: *'[Case B] still*
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9 *wants service partners; we cannot have operational employees service the whole world. We*
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11 *will have a combination of our own people, who have a lot of expert knowledge, and then*
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13 *have a good network of partners.'* Wholesalers would not drive the servitized set-up as the
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15 Programme Manager explained *'The wholesaler I see more as a stocking facility. They take*
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17 *what is hot in the market at the time, so they make sure to have it on the shelf, as the*
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19 *customer would like. And it is our job to make sure to put something on their shelf the*
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21 *customer would like.'* Thus, Case company B focused their attention for servitization on the
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23 network with installers and consumers.
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30 Relationships in the distribution chains were predominantly transaction-based with a
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32 focus on product price due to the many competitors on the market. To enable a servitized
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34 set-up, a relational approach needed to be built with installers based on mutual trust and
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36 commitment. This could be achieved through, for example, shared marketing between
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38 manufacturer and installers as the Lead Project Manager explained: *'We can share the story.*
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40 *(...) it is not a singular transaction [anymore].'* For example, the manufacturer and installer
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42 could jointly market the environmental sustainability of their remanufactured products by
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44 highlighting the recycled nature of used material more.
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50 The relationship between manufacturer and installer was already changing based on
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52 the use of digital technology and support apps for product installation and operation. The
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54 Senior Service Manager explained: *'[We are] trying to create more value add to the installer*
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56 *at the moment, which they can also use towards the customer.'* To increase relational
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58 closeness between manufacturer and installer, the manufacturer had identified different
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possibilities as the Senior Service Manager explained: *'We have some different programs. [There is] a marketing program around end-sized [products]. How can we help them [installers] sell more of some products we see being sold elsewhere. How can we have some annual development programs together that ensure that we both move in the right direction? And through that they also share the right information [with consumers] and ensure the growth, so that is followed up.'* While this reflects the already realised potential for closer installer engagement, it is also clear that it needed to be expanded to the service business to enable more collaborative relational engagement between manufacturer and installers.

These changes required a different approach to relationship management and control from manufacturer as the Senior Service Manager explained: *'[We need] to have a more professional approach to our service partners. How can we ensure they inspect properly? How can we ensure that they appear as [our] extended arm? How can we ensure that we also enable them, and also that way win more business and expand their business in a more professional way.'* This mirrors that along with the above mentioned need for closer relationships and engagement in training activities also closer control over installers' activities was required.

Institutional settings: The main drivers and main benefactors of a servitized network would be the product- manufacturer (higher market share) and the consumer (more sustainable products). The Programme Manager explained: *'"... sustainability plays a large part of the awareness of the customers. They start to worry about where the materials come from, how it is produced and what is the footprint for this product. And can it be maintained while still maintaining quality.'* To achieve this as a competitive advantage, Case company A lobbied for national regulation to define *'the methods in this document include design*

related criteria of the product and support-related criteria when the product is placed on the market, taking into account knowledge of parts that are likely to fail, need replacing, or have reuse potential.’ (Regulation draft document TC10-WG3_N102). This was aimed at furthering the institutional drive towards B2C servitization.

5. Cross-case analysis and discussion

Below we discuss and elaborate the four identified constructs (aggregate themes from our data analysis) for B2C servitization and then their connections that emerged from the cross-case analysis. Finally, we present the limitations of our study.

5.1 Cross-case analysis: Characterizing B2C servitization

This study identified four constructs that can be associated with B2C servitization. First, we find that **internal collaboration** within the manufacturer needs to be improved to increase the level of cross-functional cooperation. While internal collaboration has been indicated in the B2B literature (Bastl et al., 2019; Kreye, 2017; Raddats et al., 2017; Sampson and Spring, 2012), it is specifically recommended for highly complex offerings, such as performance-based agreements (Akkermans et al., 2019). In contrast, our research suggests, that for B2C servitization, this is an important consideration irrespective of the nature of offering.

Additionally, increased internal collaboration might oppose earlier suggestions in the B2B servitization literature, which have focused on establishing separate service departments (Baines et al., 2017; Reinartz and Ulaga, 2008). Our study hence extends the literature by showing the need for increased internal information sharing between all related service-based and product-based functions. In line with related research streams, such as Industry 4.0, some of these could be overcome or enabled by digital technologies for knowledge sharing and collaboration to overcome existing barriers in an organisation (Larivière et al.,

2017). The role of internal collaboration might be similarly important beyond B2C servitization, such as outsourcing of transportation and service triads in general (Halldórsson et al., 2019), and even for B2B servitization. Here, we suggest these as areas for future research.

A second important finding is the relevance of **product characteristics**, specifically product complexity and its management through modular product designs. Interestingly, product characteristics are rarely discussed explicitly in the B2B servitization literature. Although empirical studies typically focus around complex products (Baines et al., 2017; Bustinza et al., 2019), the actual servitization seems not affected by it. Our findings show the central role of product complexity as an enabler of B2C servitization, but might be extended to B2B contexts. More modular product designs might open up options to provide quick and efficient servitization on-site by separating or replacing a module and repairing it at another location. Moreover, it suggests that related concepts in a wider range of OM and SC literature, such as sustainability (Wilhelm et al., 2016) or circular economy (Selviaridis and Norrman, 2014) might benefit by considering potential relations between product complexity and product design and integration in the supply network.

The third construct for B2C servitization is **network**. We find that network choices regarding partner selection, training, relationship governance and joint marketing to consumers enable shaping B2C servitization. Similar issues have been explored in the literature. For example, the importance of partner selection applies to service triads in general (Hartmann and Herb, 2015; Modi et al., 2015). Similarly, relationship governance has received much attention in the B2B servitization literature (Kreye et al., 2015; Raddats et al., 2017) as well as in the service operations literature in general (Bastl et al., 2019; Selviaridis and Norrman, 2014). Our research shows the importance of relationship

governance for B2C servitization, as manufacturer s need to build relational capabilities when engaging in this strategy.

Finally, this research showed as we suspected the role of **institutional settings**. Specifically, consumer wishes and regulatory frameworks affect the potential requirements for product functioning and serviceability. The importance of regulatory influences is perhaps unsurprising given the high level of regulations in consumer products (e.g. EC, 2012), however, the servitization literature so far ignored institutional dependence of servitization strategies. Our research shows at least the relevance for consumer products, but given an increased focus on sustainable supply, this might be put more prominent on the research agenda. Even more, as servitization indirectly links to institutional settings in the context of public buyers, such as hospitals, or in offering servitization in different national set-ups (Pereira et al., 2019), our research may also point towards further investigation in B2B servitization.

5.2 Cross case analysis: Conceptualizing B2C servitization

Our findings not only suggest the relevance of known and new constructs for B2C servitization, but also connections between them. The cross-case analysis strongly suggests that there are two prerequisites for B2C servitization: internal collaboration and product characteristics.

Internal collaboration is stressed in both cases as an enabler for product-related changes. This connection aligns with suggestions from the servitization literature, which has highlighted the need for increased internal communication for successful service provision (Lightfoot et al., 2013; Sousa and da Silveira, 2017). The connection between internal collaboration and network adds to the discussion on the (joint) effects of internal and

external integration (starting with Frohlich and Westbrook (2001), for recent debate see Barratt and Barratt (2011) and Roscoe et al. (2020)). In that debate, our insights point towards an ordered connection with internal collaboration being a prerequisite for B2C servitization (external collaboration).

Product characteristics are also seen as a prerequisite for B2C servitization, but in different ways. On the one hand, products that are more complex enabled B2C servitization through the need for more technical knowledge for servicing, as Case A showed. On the other hand, reducing complexity through modular redesign made B2C servitization possible in Case B. This could suggest an inverted u-shape relationship between product complexity and B2C servitization, with potentially an optimal level of product complexity in terms of highest business value. However, these insights could also suggest that different levels of product complexity go along with different service needs and associated network set-ups for B2C servitization. Our findings extend the contemporary focus in product and service modularity on meeting customers' needs (Rajala et al., 2019), to its central role during the usage and servicing part of a product and the network needed to deliver B2C servitization.

Finally, and probably less surprising, our findings suggest that all of the above discussed linkages are affected by institutional settings. These can act as potential accelerators for B2C servitization through new regulations and societal drive towards environmentally sustainable products. So far, existing supply-chain research has focused on institutional settings as a contextual factor (e.g. Wiengarten et al., 2014; Xiao et al., 2018) mostly to distinguish between different countries. In our study, we find a more active role for changes in institutional settings. Somewhat differently, also the potential threats of product warranty and liability of the manufacturer motivates companies to strive for more direct insight into usage and condition of installed products through B2C servitization.

Figure 2 depicts a summarised framework of the concepts and connections between them.

<Please insert Figure 2 about here>

5.3 Limitations and future research

The limitations of this research offer important opportunities for future research on this topic. First, given the low level of development of and implementation of B2C servitization in industry, it was hard to detect more than two unique cases. While these cases were chosen as relevant (Yin, 2018) based on the specific character of the studied manufacturers (Baines et al., 2017), they limit the provided insights in terms of industry contexts, national contingencies, and industry networks. Each of these can be part of future research that might use our theoretical framework as a starting point. A particularly interesting area for further investigations is the possibility to offer B2C services globally, i.e. to target different customers around the globe. Issues, such as a diversified global service portfolio to enable B2C servitization in different institutional settings, including consumer mind-sets and drive towards sustainability, regulatory frameworks that support or hinder B2C servitization, and the ability of global manufacturers to drive adoption of new regulations, which can benefit their expansion into specific local markets offer interesting routes for further research. Much more work is needed in this area to explore the effect of the institutional setting on B2C servitization and specifically the nature of servitization in this context. It would be interesting to see if insights from International Business or other work on comparative institutional settings could be integrated here as well.

Second, our cases focused on plans for and exploration of B2C servitization, rather than realized B2C servitization. This is again because of the emergent nature of B2C

servitization. As a result, some of the identified themes of B2C servitization may focus particularly on the initial stages of implementing such a strategy. Follow-up work needs to explore B2C servitization in operation to widen our understanding. As was already evident from our study, a clear value creation and fair appropriation needs to be set for implemented networks. Each of these may create unique relationship dynamics in the triad and create specific performance effects of the service. Suitable lenses could be based on the double agency role of suppliers for achieving sustainability goals (Wilhelm et al., 2016) to study opportunistic behaviour, for example by the installer, and strategies for preventative actions through, e.g. vetting, and long-term contractual and relational tools to management the relationship with installers.

Third, another limitation might be our data gathering within the studied industry network focusing particularly on the role of the manufacturer. However, as demonstrated, other network actors, e.g. installers, wholesalers, and consumers, may affect B2C servitization and form important subjects for future research in this area. Consequently, future research is encouraged to take a network perspective on B2C servitization, following suggestions by Kim et al (2011), in cases with different stages of implementation across a variety of technologies, industries and consumer products.

A final point for future research relates to our starting point. We departed from existing insights in the B2B context and demonstrated distinctive characteristics for the B2C context. We encourage future research to further investigate these differences, while also considering potential overlap in concepts and relationships between them. For example, our research suggests B2C servitization seems to deviate from B2B contexts by the geographically spread of its customers. Such geographical spread is also of interest for B2B servitization where more locations are served. Of interest for both contexts is then to

investigate how many service providers can be managed and where the turning points in the number of geographical dispersion are to be able to directly serve consumers. In line, such future research across a wider range of relevant constructs could potentially arrive at a continuum of both servitization types rather than a strict dichotomy.

6. Conclusions

This research aimed to investigate the implications from manufacturers' engagement in Business-to-Consumer (B2C) servitization. As most existing studies on servitization have focused on B2B contexts (Baines et al., 2017; Kreye, 2017; Rabetino et al., 2018; Raddats et al., 2017; Vandermerwe and Rada, 1988; Zhang and Banerji, 2017), this research forms one of the first to explicitly investigate servitization in B2C contexts. This research expands our view on servitization, going beyond the original idea of creating close service dyads with few customers (Vandermerwe and Rada, 1988; Wise and Baumgartner, 1999) by adding the network perspective to service large numbers of geographically dispersed customers. Our cross-case analysis and discussion elaborate existing servitization theory to servitization in consumer settings (B2C servitization), in which configurations of product, internal and external network are the central theoretical constructs. The resulting theoretical framework provides a foundation for further theorizing and research in this area (Kivunja, 2018). This extension clarifies and stresses the relation of servitization with the supply-chain literature in general (Giménez et al., 2012; Roscoe et al., 2020; Wilhelm et al., 2016) and service triad literature in particular (Halldórsson et al., 2019; Karatzas et al., 2016; Wynstra et al., 2015) and enables discussions around sustainability and circular economy.

6.1 Theoretical implications

This research forms a conceptual basis for exploring the field of B2C servitization as it extends and adapts existing B2B-focused investigations into the emerging B2C context. Our conceptual and empirical work shows that B2C servitization requires specific theory (Kivunja, 2018) and research attention. This research offers a starting point for theorizing through its theoretical framework that identified four important theoretical constructs (internal collaboration, product characteristics, network and institutional settings) and their interrelationships (Figure 2). Following these, important avenues for future research are identified that provide stepping-stones for further theory building. Our work has important theoretical implications for the servitization literature, as it provides the conceptual basis for B2C servitization, which has thus far been largely neglected in that literature. Additionally our work theoretically enriches the conceptual basis of the service triad literature, as we identify and connect the four important constructs of internal collaboration of the OEM, product characteristics, network and institutional settings.

6.2 Practical implications

This research has important implications for managerial practice and public policy as their decision can enable or restrict B2C servitization and thus affect the aimed for sustainability effects of consumer products. Managers are required to engage in more systemic evaluations of their actions, related to both cross-disciplinary collaboration within the manufacturer (to enable service-focused product design and internal operations) as well as the wider ecosystem around them as our findings show. While many of the large manufacturers, who may currently consider B2C servitization, are structured around functional units, our research showed the need for integrating technical, buyer and

functional expertise in revising product designs to enable front-line servicing and ultimately achieve a B2C servitization strategy. This consideration is emerging in the B2B servitization literature (e.g. Raddats et al., 2019); however, our research shows that these considerations are equally important determinants for B2C servitization. Another important managerial implication relates to managing the changing relationship with installers from a transactional to a relational approach in order to enhance a B2C servitization strategy.

Furthermore, policy makers have a potentially strong role in enabling or hindering B2C servitization and the resulting potentials for increased sustainability of consumer products. Our findings show that existing and future policies form strong incentives for the decisions made by manufacturers, installers and (to a lesser degree) consumers. Current policies on product liability and warranty (for manufacturers) may hinder servitization as they incentivise product renewal and innovation instead of servicing and recycling/refurbishing at times. At the same time, increased regulations along with awareness for sustainability and reuse of materials provides a strong institutional driver for B2C servitization. Policy makers can use our insights to draft a thoughtful combination of regulations that not only enable and encourage servicing and recycling of consumer products but also regulate the wider legal implications in terms of product life cycle, including product warranty and legal liability for failures.

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Appendix

Interview guide

Context:

- 1. How would you characterise the industry context you operate in, in terms of, for example, product reputation, product failure?
- 2. Can you describe the wider setting of your wish to servitize – regulations other influences?

Benefits and costs:

- 3. What benefits and costs do you see from servitizing your consumer business?
- 4. What benefits and costs arise for your partners?

Operational tasks:

- 5. Can you explain your product’s life cycle to me (within manufacturer)?
- 6. What efforts are being made to enable technological improvement of your product?

Relationship governance:

- 7. Explain to me the relationship with your end-user?
- 8. Explain to me the relationship with your installer?

Tables and Figures

Table I: Identified potential concepts for B2C servitization

Concept	Definition	Sub-dimensions
Division of benefits and costs	Individual actors' potential gains and losses in a servitized set-up (Wise and Baumgartner, 1999)	Financial benefits (Neely, 2008): increased profit margins, predictable cash flow (Vandermerwe and Rada, 1988; Wise and Baumgartner, 1999); Operational benefit: customers focus on their core business with lower expenses for equipment operation (Vandermerwe and Rada, 1988; Wise and Baumgartner, 1999); Increased competitiveness: keep competition out from customer dyads (Vandermerwe and Rada, 1988) through buyer lock-in (Kreye et al., 2015)
Division of operational tasks	Respective responsibility for equipment-related tasks to ensure performance and operability (Vandermerwe and Rada, 1988)	Maintenance: typically with provider, including repair, monitoring, maintenance (Rajala et al., 2019) Equipment use and operation: fully with customer for relatively simple services, such as maintenance or repair (Sousa and da Silveira, 2017), or fully with provider for complex services, such as performance-based arrangements (Kleemann and Essig, 2013); Operational focus: manufacturer and/or service provider need to focus on customer needs (Wuyts et al., 2015) Customer touch points: need to manage customer influence in service production (Pereira et al., 2019), customers are required to provide information (e.g. equipment identification, site access) for service activities (Sampson and Spring, 2012) Network integrator: manufacturers are potentially required to integrate input from different players (Ramirez Hernandez and Kreye, 2021)
Relationship governance	"ability to perform in and benefit from inter-organisational relationships" (Kreye et al., 2015, p. 1235)	Coordination: "alignment and adjustment of activities, processes, and roles" (Bastl et al., 2019, p. 24; based on Gulati et al. 2012) Control: "is exerted through the managing actor's ability to maintain communication and monitor the behavior and performance of the other two actors" (Bastl et al., 2019, p. 24) Relational set-up: Customer relationship that focuses on the individual service engagement rather than long-term development (Tax et al., 2013) Transactional set-up: Customer relationship that develops over long-time periods rather than the individual service engagement (Tax et al., 2013)
Context	"the setting in which organizational practices are established and applied." (Ho et al., 2002, p. 4424)	Industry setting: creating driver for or against servitization activities (Neely, 2008); Regulations: legal ties (Niranjan and Metri, 2008) and contract support (Karatzas et al., 2016) and safeguards (Bastl et al., 2019) can prohibit or support servitization

Table II: Overview of research design and collected data

	Case A	Case B

	Mar 2018Jun 2019	Sep 2019Jan 2020
Collected data	<p>Company Background (strategy, existing supply chain, relationships)</p> <p>Interviews</p> <ul style="list-style-type: none">• Manager after sales*• Director Service Operations*• Service technician*• Manager Helpdesk*• Manager Quality Management*• Sales Manager Commercial• Director Product Management• Director sales operations• Product manager• Director Installer• Consumers 1-10 <p>Secondary data:</p> <ul style="list-style-type: none">• Site visit for several weeks at different times during research period• Meetings and presentations• Internal reports, e.g. service reports and reports on service desk activities and complaints• Data on sales and product quality 2012-2018• Company documentation e.g. Bill of Materials• Product warranty reports e.g. top spare parts and failures• Relevant regulations	<p>Company Background (strategy, existing supply chain, relationships)</p> <p>Interviews:</p> <ul style="list-style-type: none">• Senior service manager*• Lead Project Manager• Environmental Health Safety (EHS)• Head of Technical Innovation manufacturer• Programme Manager• Senior Director Product manufacturer• Senior Sales Manager• Senior Specialist Product Safety• Head of Production*• Director of Product Compliance• Senior Product Line Manager• Product Manager manufacturer• Senior Marketing Manager (Public Affairs)• Senior sustainable product specialist• Production supervisor Recycling <p>Secondary data:</p> <ul style="list-style-type: none">• Site visit for one week• Meetings and presentations (observations and one presentation document)• Company documentation (7 internal reports)• Relevant regulations (3 documents)

* Included in initial open interview round

Table III: Excerpt of coding structure

Aggregate theme	First-order themes	Exemplar quotes
Product characteristics	Product complexity	<i>"we know the application really well and we make sure that everything is properly assembled, so that is why the [product] usually has reasonably optimal operating conditions"</i>
	Material use	<i>"Our competitors are going more and more towards plastic because it is cheaper, and our customers don't give a damn. But we are [Case company], we want to be less plastics, more aluminium more metal so it can be reused and recycled afterwards. But if we are the only ones going for that, and that costs money, then it is really hard to justify the business side of that."</i>
	Modular product design	<i>"we also have to figure out what we value most, or can we find another way to find the same reliability without being melted into plastic."</i>
Internal collaboration	Internal collaboration	<i>"we need to work with product technical responsible and our technology department "okay stop using composite, stop gluing things together"</i>
Network	Transaction-based set-up	<i>"So our relationship with our distributors is very much in this category focused on price, these products are being commodities, so there are a lot of players around the sale of such a simple product"</i>
	Lack of direct access	<i>"we have in fact a fairly limited direct relationship with the end user, and in fact also direct relationship with the installer"</i>
	Relational set-up	<i>"where you see with the partners and the customers where we have a certain amount of trust and we deal with them as a partnership we see that we can work together and we can see as a result the relationship get even stronger, because we are working as a partner on this issue, you can see that there is more goodwill on both sides"</i>
	Training	<i>"Our technicians can provide training on how to set up the [product], why have we made the features that are in the [product]."</i>
	Control	<i>"it is of course super important that we have control over it and in this way we live up to our overall ambitions"</i>
	Immediate wins	<i>"For [these products], people are reluctant to do the repair themselves. They are much more likely to call the installer."</i>
	Indirect benefits	<i>"there is a key selling point for the [installer] who says it can be difficult to set the [product] up right out there [i.e. on consumer sites]. So we have had some [applications] with different functionalities that make them not have to think terribly much about how they set up the [product]."</i>
Institutional settings	Compliance with existing regulations	<i>"we are very much on chemical compliance, so we really have a lot of clean material to stand on, for example, until the last update of reach we have not used materials from the banned anaxis"</i>
	Proactive influence on industry standards	<i>"We have actually requested a statement on long-term sustainability from our suppliers so as not to end up in a situation that it is no longer possible to use them for sustainability reasons"</i>
	Consumer preferences	<i>"some of our customers they are having these green boiler which is using recycled materials which is more efficient"</i>

Figure 1: Coding structure

Figure 2: Theoretical framework for B2C servitization