Paradoxes in servitization: A processual perspective

Abstract

Servitization describes a paradoxical and lengthy transformation process in the field of manufacturing, requiring manufacturers to move from competing on the basis of their products to competing on the basis of their services; yet the delivery of these services relies on the production of high-quality products. Such transformations may take several years, necessitating manufacturers to balance the competing demands of both the product and service businesses, as well as navigating their interdependency. In order to illuminate these competing demands, and understand their progression over the course of a manufacturer's servitization journey, the present study conceptualises a processual perspective on the paradoxes inherent in servitization. The conceptualisation of the processual perspective integrates a servitization stage model with established paradox theory to depict the paradoxical tensions that servitization creates, while also demonstrating how, and when, these emerge. The conceptualisation is applied to longitudinal data from three case studies that reconstruct the manufacturers' experiences from the point of the initial exploration of servitization to the implementation of their outcome-based service offering. The findings identify how learning, belonging, organising and performing paradoxical tensions emerge over time, and how they unfold and change depending on the objectives and activities of the manufacturers' servitization stage.

1 INTRODUCTION

While servitization provides significant economic and strategic opportunities for manufacturers (Lightfoot et al., 2013), it also creates competing demands – a source of tension for manufacturing organisations (Lenka et al., 2018b). Servitizing manufacturers simultaneously seek to customise service solutions while maintaining production efficiency (Kohtamäki et al., 2020a), or enable the exploitation of customer and product data by production and service teams while maintaining centralised control (Toth et al., 2020). The process of transforming from a product manufacturer to an outcome-based service provider requires manufacturers to manage tensions that stem from seeking to accommodate multiple competing demands.

How organisational processes are shaped by competing demands and their resulting tensions is a critical focus of paradox theory (Quinn and Cameron, 1988; Lewis, 2000), which explicitly concentrates on the identification of seemingly contradictory elements within the transformation of organisational systems (Quinn and Cameron, 1988) and the cognitive and emotional stress they exert at an individual and organisational level in the form of paradoxical tensions (Smith and Lewis, 2011). There is a growing interest in investigating such paradoxical tensions in the servitization context to better understand the substantial challenges manufacturers face when developing and providing outcome-based services (Kohtamäki et al., 2018). Kohtamäki et al. (2020a), for example, explore the tensions with which servitizing manufacturers are confronted when attempting to integrate their service and product organisations for the purpose of generating synergies, while simultaneously separating them in the pursuit of stimulating focused service innovation.

While the emerging research insights confirm the applicability of paradox theory to the servitization context, they also highlight a gap in our understanding as to how the processual nature of servitization (Baines et al., 2020) affects the emergence of these paradoxical tensions. Servitization represents a substantial and lengthy transformation process during which the context and objectives of the manufacturer at one stage establishes the framework for the next (Murray et al., 2019). While servitizing manufacturers initially focus on identifying opportunities that specific outcome-based service models could provide (Martinez et al., 2010), their attention shifts towards optimising service delivery (Rabetino et al., 2017) and exploiting synergies between the service and product businesses (Ziaee Bigdeli et al., 2018) as they progress in their servitization journey. Only by explicitly considering the changing context that servitization engenders for manufacturers can the emergence, or absence, of paradoxical tensions within the servitizing manufacturer be explained, and decision-makers be supported in the effective management of these paradoxes (Smith, 2014). Hence, to understand more fully the paradoxical tensions a servitizing manufacturer experiences, our study investigates the

following question: *What paradoxical tensions do manufacturers face as they progress in their servitization journey*?

To answer the research question, this study develops a conceptual framework of paradoxes in servitization. The framework integrates the Baines et al. (2020) servitization model, which explains how servitizing manufacturers move from their early exploration of servitization to the subsequent exploitation of their business model, invoking Smith and Lewis's (2011) organisational paradox conceptualisation, which differentiates between learning, belonging, organising and performing paradoxes. The integrated conceptual framework was used to analyse the servitization journeys of three servitizing manufacturers, drawing on extensive longitudinal interview data from decision-makers outlining their transformation to identify the competing demands and explain the surfacing of the paradoxical tensions. The findings recognise a variety of competing demands in servitization, and reveal how the changes in context within manufacturing organisations affect the surfacing of paradoxical tensions and, specifically, how the context and objectives of the early servitization stages contribute to the surfacing of particular tensions, whereas other tensions emerge at later stages.

The study and its findings extend the servitization literature and its exploration of paradoxes (Smith and Lewis, 2011) in three specific ways. First, the study contributes to building a processual perspective on paradoxes in servitization, recording how the stage of the manufacturer's servitization journey impacts on the emergence of paradoxical tensions. The study shows how, at the outset, manufacturers face various learning tensions, while organising, performing and belonging tensions emerge later when significant adjustments to the manufacturer's organisational processes, structures and culture are put in place. Second, the study adds to the range of paradoxical tensions that are specific to the servitization context. Third, by developing a conceptual framework that explicitly integrates the emerging theorisation of servitization stages (Baines et al., 2020) with an established paradox theory (Smith and Lewis, 2011) and its servitization-specific application (Kohtamäki et al., 2018), the study further lays the foundations for the development of a cumulative research tradition for future examination of paradoxes in servitization. The present study also contributes to servitization practice by helping decision-makers not only to understand the range of tensions servitization creates, but to also anticipate when and how these may surface, thereby enabling their active management.

The study has been structured in the following way. In the background section we outline and synthesise key elements of servitization and paradox theory to formally conceptualise a processual perspective on paradoxes in servitization. The following sections describe the methodology, present the findings, and outline our contributions to servitization research and practice.

2 BACKGROUND

2.1 SERVITIZATION

The literature defines servitization as the transformation process manufacturers undergo when shifting from being a product provider to becoming a provider of outcome-based services (Martinez et al., 2017; Kowalkowski and Ulaga, 2017; Brax and Visintin, 2017; Weick and Quinn, 1999). As the transformation process extends from early explorations of the opportunities service offerings could provide, to the effective delivery of these offerings, servitization often spans several years (Kowalkowski et al., 2017). Although servitization is explicitly defined as a longitudinal process (e.g. Vendrell-Herrero et al., 2014), investigations largely examine it from a static, instead of a processual, perspective (Baines et al., 2020). As a result, corresponding studies have theorised on variance or configurational aspects of servitizing manufacturers (e.g. Ziaee Bigdeli et al., 2021; Adrodegari et al., 2018; Gebauer et al., 2010), instead of engaging in "theorising that explicitly incorporates temporal progressions of activities as elements of explanation and understanding" (Langley et al., 2013, p. 1).

Processual perspectives emphasise dynamic and temporal sequences in order to identify how one distinct development sets the stage for the next (Murray et al., 2019), and explain the unfolding of complex social processes over time (Ancona et al., 2001; Van de Ven, 1992). To provide such a processual perspective on servitization, a number of studies have proposed dedicated stage models (Baines et al., 2020; Kowalkowski and Ulaga, 2017; Martinez et al., 2017; Lütjen et al., 2017). Servitization stage models provide structured approaches to show how such full-scale transformations can be achieved by manufacturers (Rönnberg Sjödin et al., 2016), and how manufacturers' objectives and activities change over the course of transformation (Van de Ven and Poole, 1995).

Although different servitization stage models have already been developed (Brax and Visintin, 2017) (i.e. Baines et al., 2020; Kowalkowski and Ulaga, 2017; Martinez et al., 2017), they are not equally suitable for developing a processual perspective on paradoxes in servitization, which is the primary objective of the present research. The models by Kowalkowski and Ulaga (2017) and Martinez et al. (2017), for example, which offer 12 stages, or 36 steps, become unmanageable when integrated into a new context. Hence, this study uses the servitization model by Baines et al. (2020), which conceptualises the progression of servitizing manufacturers along four stages:[1] Stage 1: manufacturers'

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[1] Ziaee Bigdeli and Baines (2017) and later Baines et al. (2020) use the terms 'exploration' and 'exploitation' to label the two endpoints of a single specific servitization venture. To avoid confusion with the ambidexterity discourse (He and Wong, 2004), which describes how organisations engage in simultaneous exploration and exploitation, the servitization stage titles have been substituted as follows: Stage 1 (exploration), Stage 2 (engagement), Stage 3 (expansion) and Stage 4 (exploitation).

initial contact with, and study of, servitization; Stage 2: experimentation and co-development of specific outcome-based services; Stage 3: increasing the scale of innovation and integration of the product-service offerings; and Stage 4: optimisation and delivery of the servitization portfolio. By describing a clear sequence of steps, the model conceptualises how manufacturers change their objectives and efforts, depending on which servitization stage they have reached (Baines et al., 2020; Ziaee Bigdeli and Baines, 2017). In the next section, we integrate the Baines et al. (2020) servitization model with paradox theory.

2.2 PARADOXES AND TENSIONS

2.2.1 Paradox theory

To consolidate the vast (and at times diverging) paradox literature, Smith and Lewis (2011) formally defined two core concepts: paradoxes and paradoxical tensions. Paradoxes are defined as "contradictory yet interrelated elements that exist simultaneously and persist over time" (p. 382). The elements are "contradictory yet interrelated", as they seem "logical when considered in isolation but irrational, inconsistent, and even absurd when juxtaposed" (p. 386). Contradictory elements are often expressed through the competing demands they create, as exemplified in the exploration vs. exploitation strategy discourse (e.g. Raisch and Zimmermann, 2017; Papachroni et al., 2014; Andriopoulos and Lewis, 2009); both strategies seem logical on their own, but their simultaneous adoption requires organisations to synchronise incremental steps and radical change, which often create tensions within an organisation (Birkinshaw and Gibson, 2004).

The paradoxical tensions describe the cognitive and emotional stress that originates from the perception of the competing demands of the paradox (Raza-Ullah et al., 2014), as well as the attempts to manage it (Bengtsson and Raza-Ullah, 2016). These tensions are often experienced at an individual level, or within a team, but can spread across the wider organisation (Gnyawali et al., 2016). Although paradoxes "persist over time" (Andriopoulos and Gotsi, 2017), they may remain "latent" until they are surfaced by particular contextual conditions and experienced as paradoxical tensions (Smith and Lewis, 2011). Changes in contextual conditions that have been shown to surface paradoxical tensions include: the emergence of a multiplicity of powerful views ("plurality") (Pinto, 2019); new opportunities ("variation") (Smith and Tracey, 2016); and the need to distribute scarce resources ("scarcity") (Miron-Spektor et al., 2018). Thus, considerations of the changing organisational context are critical to understanding paradoxes and the tensions they engender.

While the organisational literature reports a wide range of experienced tensions, reflecting the diversity of changing contexts and subject domains (e.g. Dameron and Torset, 2014), four categories – learning,

belonging, organising and performing – are commonly used to group paradoxical tensions based on the competing demands that shape them (Smith and Lewis, 2011; Lewis, 2000). Learning tensions relate to the competing demands of exploiting established knowledge and the exploration and construction of new, frame-breaking knowledge (e.g. Raisch and Zimmermann, 2017). Belonging tensions originate from the competing demands of the identities of the individual and the wider group (e.g. Keller et al., 2017). Organising tensions originate from efforts to reconcile the separating and integrating entities within structures and processes (e.g. Jarzabkowski et al., 2013). Finally, performing tensions capture the contrast between short-term and long-term targets, and the competing strategies and goals within organisations (e.g. Jay, 2013).

Paradoxes are largely interpreted as problems that require solutions (Cunha and Putnam, 2019). They surface as tensions that create ambivalence (Ashforth et al., 2014), organisational decline (Bartunek et al., 2000; Das and Teng, 2000) or even collapse (see Schad et al. (2016) and Putnam et al. (2016) for a full review). Moreover, efforts to resolve these tensions may yield further tensions, which can create a vicious circle (Tsoukas and Pina e Cunha, 2017). Yet some studies also point to the virtuous implications of paradoxes. They interpret paradoxes as sources of creativity and innovation (Gebert et al., 2010), ambidexterity (Raisch and Birkinshaw, 2008) and long-term sustainability (Andriopoulos and Lewis, 2009). The key to creating these virtuous implications lies in the recognition of their underlying competing demands and the effective management of the tensions they bring about (Smith and Tushman, 2005).

2.2.2   Paradoxes in servitization

While the term 'paradox' is frequently used in the servitization literature, it is often employed in different and sometimes inconsistent ways. For example, studies use it to describe the difficulty of integrating services into established product businesses (Brax and Gustafsson, 2005), or the challenges of managing product-based and service-based business models in parallel (Palo et al., 2019). Gebauer et al. (2005) coined the term 'service paradox' to frame the counterintuitive observation that some manufacturers, despite making substantial investments in their services business, may not draw sufficient revenue from their servitization efforts (a line of research that others have reinforced; for example, Cenamor et al. (2017), or Li et al. (2015)). More recently, Kohtamäki et al. (2020b) and Gebauer et al. (2020) have explored the role of the 'digitalisation paradox' within servitization, describing the challenges organisations face in deriving sufficient returns from their digitalization investments, and how the challenges of digitalization and servitization may reinforce one another (Gebauer et al., 2020).

However, other studies (e.g. Kohtamäki et al., 2020a; Toth et al., 2020) explicitly draw on formal paradox theory (Smith and Lewis, 2011; Lewis, 2000; Quinn and Cameron, 1988; Kohtamäki et al., 2020a; Toth et al., 2020) to understand the underlying competing demands in servitization, and the range of paradoxical tensions to which they give rise, thereby illustrating the theory's applicability to a servitization context. Kohtamäki et al. (2020a) use organisational paradox categorisation (Smith and Lewis, 2011; Lewis, 2000) to explore a number of paradoxical tensions, their interactions as well as attempts to resolve them in manufacturers' servitization. Their findings identify the competing demands in servitization in the form of learning (customising solutions vs. manufacturing products efficiently), belonging (developing customer orientation vs. maintaining an engineering mindset), organising (integrating vs. separating services and product organisation) and performing (innovating service solutions vs. exploiting product innovations). A study by Kohtamäki et al. (2020a) further highlights the performing tension as the cause of concomitant tensions, and describes several coping practices that manufacturers utilise to respond to them. Toth et al. (2020) also apply organisational paradox categories (Smith and Lewis, 2011; Lewis, 2000) to explain tensions within servitizing manufacturers, focusing on their impact on business growth and the supply chain.

While prior studies have confirmed the applicability of paradox theory to the servitization context, they have not yet considered the particular processual nature of servitization - the fact that the manufacturer's transformation usually takes place across several stages, in disparate contexts and with differing objectives (Ziaee Bigdeli and Baines, 2017). Yet exploring how a changing organisational context affects the emergence of paradoxical tensions, and when, and in what form, these tensions become salient and are central to paradox theory (Smith and Lewis, 2011). Indeed, researchers in other domains have explicitly adopted processual perspectives to show how paradoxical tensions interact with the generative properties of organisations (Garud et al., 2006), and determine the efficacy of managerial interventions to resolve paradoxical tensions (Tushman et al., 2010; Raisch, 2008). Adopting a processual perspective to investigate the emergence of paradoxical tensions arguably better reflects the dynamic reality of organisations and creates more pertinent research insights and managerial recommendations (Birkinshaw et al., 2016).

Thus, adapting a processual perspective on paradoxes in servitization provides an opportunity to (i) consider the dynamically changing contexts and objectives of manufacturers when exploring the competing demands of servitization; (ii) develop a longitudinal understanding of the paradoxical tensions and their surfacing; and (iii) derive managerial recommendations that better reflect the particular challenges manufacturers face in the specific stages of their servitization journey. Such a perspective would also help address specific calls for the integration of a temporal dimension within investigations of wider organisational paradoxes in servitization (Toth et al., 2020).

To help advance such a processual perspective on paradoxes in servitization, the present study combines Baines et al.'s (2020) servitization stage model with Smith and Lewis's (2011) organisational paradox categories in the form of an integrated research framework (see Figure 1). In Figure 1, the rows display the paradox categories, indicating the range of competing demands that may surface in the form of paradoxical tensions within a manufacturer's servitization journey. The stages of the servitization journey are displayed in the form of columns highlighting the manufacturers' shifting contexts and objectives. It is thus the intersection between the servitization stages and paradoxical tensions that aids in understanding *the paradoxical tensions manufacturers face as they progress in their servitization journey* and, therefore, represents the focal point of the investigation.

Servitization stage					
STAGE 1	STAGE 2	STAGE 3	STAGE 4		
Initial learning about servitization	Experimentation and co-development of specific outcome-based services	Increasing the scale of innovation and integration of the product-service offerings	Optimisation and delivery of the servitization portfolio		
Tension between exploiting the established knowledge and building up new frame-breaking knowledge				Learning	Organisational paradox category
Tension between own identity and the identity of the wider group				Belonging	
Tension between separating and integrating entities within structures and processes				Organising	
Tension between short-term and long-term targets				Performing	

(Left vertical label: Paradoxical tension surfaced between competing demands)

Figure 1 Conceptual framework

3 METHOD

3.1 DATA COLLECTION

A multiple case research method was used to examine the paradoxical tensions manufacturers face in the course of their servitization journey. Case research provides detailed descriptions of phenomena related to this context (Yin, 2009), is apposite for linking key events and actors to causal chains (Benbasat et al., 1987), and is widely used to study paradoxical tensions (Andriopoulos and Gotsi, 2017; Jay, 2013) and process-based phenomena (Bluhm et al., 2011). For this study, a variable-oriented multiple case study was adopted (Miles et al., 2014) to explore how the processual nature of servitization impacts the paradoxical tensions. Accordingly, this study considers the stages as impact variables and is "looking for themes that cut across cases" (Miles et al., 2014, p. 103) instead of focusing on the differences between cases (following Breidbach and Maglio, 2016). Drawing on multiple cases

expands the number of instances and variations of the phenomena under investigation, which adds to the external validity of the findings (Gerring, 2004).

To ensure a wide representation of scenarios, cases from various types of industry and of different sizes were sought (Barratt et al., 2011). Three manufacturers were selected as case companies to strengthen the generalisation of the research findings (Miles et al., 2014; Yin, 2005). Each manufacturer has been involved in servitization for more than three years and, by the end of the data collection, had been focusing on the implementation and integration of their outcome-based services (Stage 3 of the Baines et al. (2020) model). AutoCo has over 50 employees and is focusing on bespoke automation machinery; CleanCo has more than 2,000 employees in 25 countries and is producing industrial filtration products; while SpeedCo has more than 2,800 employees in over 120 countries and is producing industrial printing products.

Data collection took place between March 2017 and June 2019 in the form of interviews and participant observations. A total of 50 semi-structured interviews with representative members leading, or contributing to, the implementation of servitization in the case companies were used as a primary means of data gathering (see Table 1). Several of the interviews (marked with an asterisk) were serial interviews, which allowed for periods of reflection between the interview sessions, processing of initial findings and the validation of the critical events, as well as facilitating an understanding of the unfolding servitization processes (Jarzabkowski et al., 2013). The interview lengths varied, with the shortest being 33 minutes and the longest being 135 minutes, depending on the time availability of the informant.

Participant observations included opportunities to act as observers in the case companies' environments. For all cases this included the attendance of two half-day workshops and a site-visit where additional documentation outlining aspect of the servitization journey was made available. The interview data together with the observations, archival data, and the review of documentation from the case companies, enabled data triangulation and the validation of findings (Barratt et al., 2011; Pouliot, 2007).

Table 1 Interview data overview

Company	Outcome-based services / Informants
AutoCo	Design as a service
	4 interviews with 3 individuals General Manager (AM1, 2)*, Service Solutions Leader (AM3), Managing Director (AM4)
CleanCo	Monitoring as a service

	25 interviews with 19 individuals
	    Senior Vice President (CM1,2,3,4)*, Business Development Lead (CM 5,6,7), Business Analyst (CM 8, 9),
	    Technical Product Manager (CM10), VP Product Marketing (CM11), VP IoT Platform and Services (CM12),
	    Group Controlling (CM13), Global Knowledge and Training Manager (CM14), Quality and Sustainability
	    (CM15), VP Product Management (CM16), VP Product Development (CM17), Service Manager (Regional)
	    (CM18), Solutions Sales Manager (CM19), Electrical Controls Engineer (CM20), Technical Director (CM21)

SpeedCo	Printing as a service
	21 interviews with 20 individuals Sales Director (SM1,2)*, Head of Service (SM3), IoT Development Leader (SM4), Service Manager (SM5), Service Manager (SM6), Service Manager (SM7), Service Manager (SM8), Service Manager (SM9), General Manager (SM10), Service Manager (SM11), Service Manager (SM12), Service Manager (SM13), Regional Director (SM14), Managing Director (SM15), Leader of Distribution Business (SM16), Regional Development Director (SM17), Global Aftermarket Manager (SM18), Product Manager, Business Development Director (SM19), Service Manager (SM20)

 * *serial interviews conducted to capture the unfolding servitization processes.*

Given the aim of capturing insights pertaining to tensions that have been experienced, as opposed to objective facts, the design of the interview questions sought to elicit narratives that convey an understanding of those experiences and how they unfolded (Roberts, 2020), and avoided nudging interviewees towards offering desired responses (Beverland, 2001). Interview questions were thus formulated to capture the organisational background and the current state, development and delivery of the most recent outcome-based service offerings (e.g. How have the outcome-based offerings evolved through time?). Follow-up questions were used to probe the informants' individual experiences and reflections (e.g. Over your tenure at [company name], what have been some important initiatives and changes that [company name] has engaged in?). Hence, descriptions of tensions emerged as part of the narrative and were elaborated on through follow up questions. To facilitate the retrospective reconstruction of the interviews, each session was recorded and notes were taken on an 'interview map' designed to capture chronological developments (Siggelkow, 2002). All interviews were transcribed and, together with the other material, formed the basis for data analysis.

3.2 DATA ANALYSIS PROCESS

The case data was scrutinised using elements of Smith's (2014) four-step analysis and Bowen's (2009) deductive thematic analysis. Step 1 of the analysis focused on each case individually to develop the chronological case story of its servitization journey, from its initiation to the date of the interview (Langley et al., 2013; Jarzabkowski et al., 2013). The step also included creating a simplified critical-event timeline of the manufacturer's servitization journey (see Figure 2). The significance of the critical events was determined, firstly, through the judgement of the researcher evaluating these events; secondly, through the judgement of the interviewees (Van de Ven & Poole, 1995); and, thirdly, by relating the identified events to those regarded as most consequential in the servitization literature.
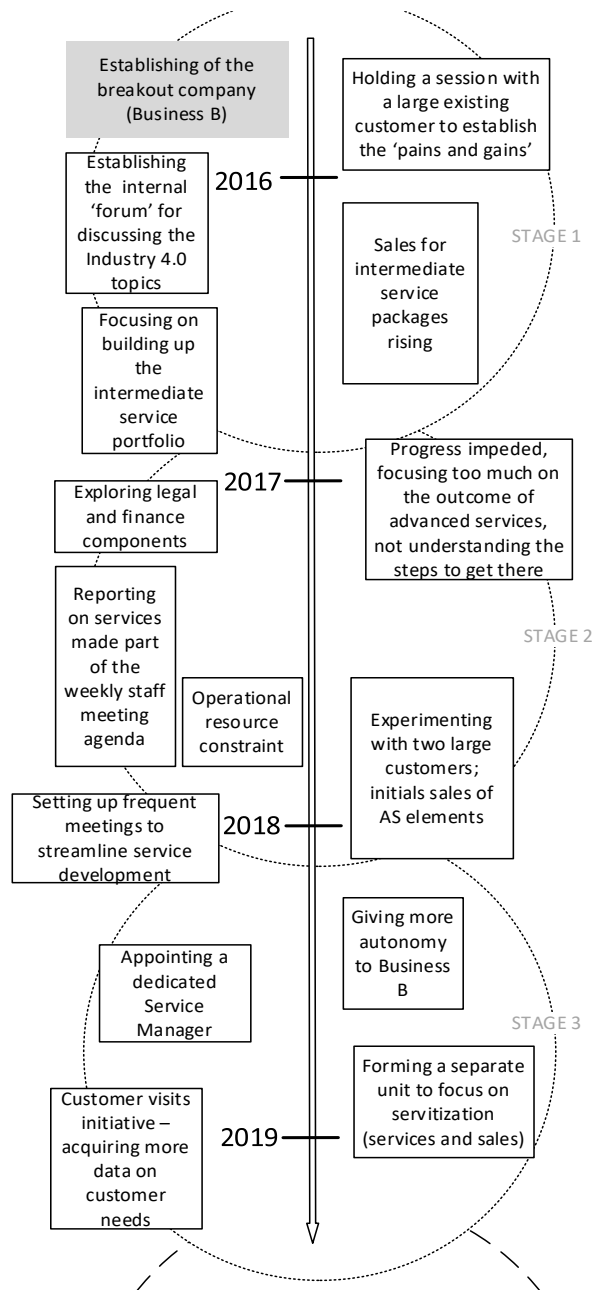
Figure 2 Example of a timeline for AutoCo's critical servitization events

During step 2 of the analysis, in the first instance, indicator terms proposed by Andriopoulos and Lewis (2009) and Smith and Lewis (2011) (e.g. "challenging", "difficult", "tension", "problem", "hard", "unclear", "confusing") were used to identify descriptions of potential servitization-related tensions within the primary data. To further assess whether the identified tensions harboured characteristics attributable to paradoxical tensions, cross-checking was undertaken and searches for the extracts containing, but not limited to, words such as "tension", "yet", "balance", "but", "on the one/other hand", "friction", "how can you", and "still".

Further interpretation and contextualisation of the identified tensions focused on understanding their underlying competing demands. The analysis sought to verify their contradictory nature, interdependency and limited indication of being resolved (persistence) to confirm the identified tensions as paradoxical (Smith and Lewis, 2011).

The identified paradoxical tensions were subsequently further allocated into organisational paradox categories (Smith and Lewis, 2011; Lewis, 2000) based on the nature of their underlying competing demands (Smith and Lewis, 2011; Kohtamäki et al., 2018), namely: learning (capturing tensions between exploration and exploitation); belonging (capturing tensions between the self and the group); organising (capturing the opposing processes of separating and integrating); and performing (capturing the competing strategies and goals) (see also section 2.2.2 of the Background section). Table 2 provides an example of a paradoxical tension identified in the interview data, which was categorised as a performing tension.

Table 2 Example of categorising the paradoxical tensions into organisational paradox categories

Paradoxical tension	Competing demands	Interview data
Performing tension	Maintaining product business efficiency	'… [parent company] would definitely take a view on that and are not, at the end of the day if it took an extra year to turn the profits than we thought, that would be a real problem as a PLC, it's manageable with [parent company] as a parent who tend to take the medium view, perhaps not as long-term …, but definitely everything they do is based on a three year plan. Of course, there's a keenness to hit the year's numbers as well, but that's not the be all and end all, whereas as a PLC hitting the quarter numbers was all that mattered really. And much as we could talk about strategy and if it came to it, it was a month end from the quarter and the numbers weren't right, everything changes to prioritise on getting the numbers.' (SM17)
	Focusing on service business growth	'…the discussion obviously is between service and cost. So, we can provide that kind of solution, but if we get the revenue…. How can you be efficient to provide more service with the same costs?' (SM7)

'…I mean we've got an autonomy…to make the numbers…we have to find a way to take over the service number, to find a way to repay the service contracts and service on demand, so the [offering] is there for that. So, the aim is definitely to sell as many service [offering] contracts, but we can make them as profitable as we can, so we've got sufficient margin to recover on the service contracts. My concern is that we are losing a lot of time.' (SM10) |

In Step 3 of the analysis, the critical event timelines developed in Step 1 were used to aid the mapping of those identified paradoxical tensions against the chronological understanding of the servitization journey. The key tension instances were separated into identifiable phases ("temporal brackets"), presenting the servitization journeys as a sequence of servitization stages based on the manufacturer's dominant objectives and activities (following Baines et al., 2020). This step also facilitated the identification of paradoxical tensions that appeared multiple times within the same servitization stage, providing confirmation of the wider representativeness of the case findings.

Step 4 of the analysis focused on identifying 'themes that cut across cases' (Miles et al., 2014, p. 103). This step enabled the elicitation of themes that consolidate those paradoxical tensions identified within the individual cases, providing a comprehensive understanding of the paradoxical tension phenomena in servitization (Voss et al., 2002; Meredith, 1998). The results of the analysis are presented in the following Findings section.

4 FINDINGS

The analysis of the three servitization journeys identified a variety of paradoxical tensions that emerged in the case companies. The subsequent analysis shows how the paradoxical tensions differ between the early and late stages of the manufacturers' servitization journey.

4.1 STAGE 1

Stage 1 of the servitization journey captures the manufacturers' initial exploration of the servitization concept. It runs from the decision to explore servitization to the point where the core stakeholders are confident that servitization represents a viable opportunity (Baines et al., 2020). The analysis of the critical events within this transformation stage identified paradoxical tensions as exemplifying the learning and belonging organisational paradox categories (Table 3).

Table 3 Paradoxical tensions in Stage 1

STAGE 1 "Initial exploration of the servitization concept"	
Paradoxical tension	Competing demands
Learning tension: Tension between exploiting the established knowledge and building up new frame-breaking knowledge	Exploiting the established product knowledge vs. exploring the potential of servitization
	Utilising R&D capabilities for product innovation vs. investigating digitisation and servitization
Belonging tension: Tension between own identity and the identity of the wider group	Sustaining the product business mindset vs. establishing a service-oriented mindset

The learning paradox category captures tensions that are based on the competing demands of exploiting established knowledge and exploring new knowledge (Lewis, 2000). The analysis signifies that, even in its initial stage, servitization has surfaced learning tensions across all three servitization cases. The interviews revealed that the initial exploration helps manufacturers to recognise that servitization requires them to engage in further investigation of critical digitalisation and servitization

topics, which limits the resources and attention manufacturers can give to the further development of their product expertise. The realisation of these learning needs is expressed by a SpeedCo representative:

> *"We've… got a working hypotheses of where we want to get to… But our challenge right now is that we don't think we've got the capability to get there yet, and this is all about how do we build the capabilities to get there."* (SM1)

These early learning tensions were recognised by all three case manufacturers, either in the form of concerns about the gaps in their current knowledge base or in resource allocation conflicts as manufacturers sought to balance competing demands. In addition, in the case of AutoCo, the analysis of the early servitization stages also provided instances of the belonging tension, exemplifying an identity conflict (Lewis, 2000). The company relied on the strong product-orientated culture that has been defining the business for over 30 years. A realisation occurred, though, that servitization requires cultivating a service-oriented mindset which clashed with the deeply rooted, product-focused company identity. This is highlighted by the AutoCo representative:

> *"We always looked at [services] as a distraction to the business, so we didn't actively go out and engage in trying to win that business, because we were focused upon all of the 25-30 projects that we were trying to run here. It was viewed in the business as a distraction."* (AM1)

4.2   STAGE 2

Stage 2 captures the manufacturers' efforts to develop service-based value propositions and evaluate their specific design and delivery implications. The stage starts with the consent for engaging in the development and ends once the potential for servitizing has been accepted within the organisation (Ziaee Bigdeli and Baines, 2017). The critical events within this transformation stage identified a number of paradoxical tensions, exemplifying all four organisational paradox categories: learning, belonging, organising and performing (Table 4).

Table 4 Paradoxical tensions in Stage 2

STAGE 2	
"Developing and piloting outcome-based service propositions"	
Paradoxical tension	**Competing demands**
Learning tension: Tension between exploiting the established knowledge and building up new frame-breaking knowledge	Identifying digital opportunities vs. identifying customer needs
	Prioritising delivery of intermediate offerings vs. piloting outcome-based services
	Creating internal service development capabilities vs. using external service development capabilities
Belonging tension:	Sustaining the product business mindset vs. adapting a service-oriented mindset

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Tension between one's own identity and the identity of the wider group	
Organising tension: Tension between separating and integrating entities within structures and processes	Allocating services inside the product business vs. creating an independent service function
	Top-down service innovation vs. bottom-up service innovation
	Promoting the service leadership locally vs. facilitating the service leadership globally
	Organising the business structure to support the product business vs. reorganising for service business
	Maintaining the core product business vs. devoting resources to exploring servitization
Performing tension: Tension between short-term and long-term targets	Setting local product targets vs. setting global service targets
	Meeting product sales targets vs. piloting outcome-based services
	Relying on transactional selling vs. building up relational selling

While some of the Stage 2 learning tensions persisted from Stage 1, other tensions were identified that reflect the specific focus of Stage 2 servitization activities. The analysis of the data showed how the development and evaluation of various service pilots helps manufacturers to better understand the different areas of expertise (e.g. digitalisation and customer needs) required to design outcome-based services, and also how these areas within the servitization effort compete against each other.

Another tension identified in Stage 2 relates to the service level manufacturers may prioritise. While a focus on an intermediate level of services is seen as a fast (but low-value) route to market, a focus on high-value services is seen as more risky, but also more rewarding. Although these alternatives compete for attention and investments, they are also interdependent in the expertise they require and the insights they generate. Moreover, the learning tension emerged from the competing (and contradicting) knowledge sourcing demands: while outsourcing and the use of external service development capabilities may, in fact, accelerate service development, they might also deprive the manufacturer of important learning experiences.

In addition, instances of the belonging tensions were identified for Stage 2 of the servitization journeys, relating to the product-service mindset challenges identified in Stage 1: the tension between the competing demands of a product- and a service-oriented mindset was shown to intensify as several outcome-based service offerings are being developed and tested, and first failures and customer push-backs are encountered.

The analysis of Stage 2 of the servitization journeys also identified instances of organising tension, describing separating and integrating tensions within the manufacturers' structures and processes

(Kohtamäki et al., 2018). In particular, the analysis showed that manufacturers consider opportunities to set up dedicated service functions that can operate independently of the product business and facilitate exploration. However, the reality of the tight interdependence between product- and outcome-based services also creates challenges for such structural separation. This is described by a CleanCo representative:

> *"Our peers… they don't know how to interact with us: what do you do, what do I do, who should do what? It is a little bit organisational and structural challenge as a sidekick."* (CM4)

While SpeedCo sought to tightly align product- and service-development functions, CleanCo established a separate business unit to lead servitization; but they both faced organising tensions as part of their servitization journeys. Other organising tensions identified at this stage highlighted the contradictions regarding the service innovation drivers (top-down vs. bottom-up; local vs. global).

Performing tensions were also identified in Stage 2, revealing how servitization creates tensions between the short- and long-term targets of manufacturers (Smith and Lewis, 2011). The analysis identified that, already at this design stage, the setting of targets can create conflict, as it may drive divergent behaviour between the product and service businesses. General concerns were raised over the fact that the development of centrally-driven performance targets would institutionalise a conflict with the locally set product targets, although both businesses are dependent on each other, as explained by a CleanCo representative:

> *"If there's any small or large notion that we are somehow starting to compete with the divisions then it's impossible. We're not a big enough company for that, so we need to be doing this hand-in-hand somehow, and not in opposition to each other."* (CM12)

More specifically, concerns were raised over whether, despite the pursuit of high product-sales targets improving the sales of products, this would also limit the extent of locally run service pilots, which are critical for data capture and the development of outcome-based service offerings.

4.3   STAGE 3

Stage 3 captures the implementation of the service offerings, as well as demonstrating the creation of service value. The stage is initiated with the consent for service implementations and ends once the significant value creation opportunity is made clear (Baines et al., 2020). The critical events within this transformation stage identified a number of paradoxical tensions, exemplifying all four organisational paradox categories: learning, belonging, organising and performing (Table 5).

Table 5 Paradoxical tensions in Stage 3

STAGE 3 "Increasing the scale and speed at which the outcome-based services are innovated and implemented"	
Paradoxical tension	**Competing demands**
Learning tension: Tension between exploiting the established knowledge and building up new frame-breaking knowledge	Developing the core product business vs. further refining the service business
	Developing the service leadership locally vs. developing the service leadership globally
	Prioritising delivery of intermediate offerings vs. developing outcome-based services
Belonging tension: Tension between one's own identity and the identity of the wider group	Fulfilling strategic functions vs. fulfilling operational functions
	Sustaining the product business mindset vs. scaling a service-oriented mindset
Organising tension: Tension between separating and integrating entities within structures and processes	Following product development cycle vs. following service development cycle
	Organising for maintaining the core product business vs. restructuring for exploiting services
Performing tension: Tension between short-term and long-term targets	Maintaining product business efficiency vs. focusing on service business growth
	Meeting the global product targets vs. experimenting with the service business

In Stage 3, the identified learning tension between delivering for efficiency and delivering for customisation persists, although in different ways. As manufacturers seek to select and implement their outcome-based offerings, the challenge of bridging these competing demands in servitization becomes even more acute. This is outlined by the AutoCo representative:

> *"We are still piloting all of these different elements and finding what works, what doesn't work, and I think what we are realising is that it is different for every customer… you are there trying to create this idea of what is perfect servitization, but it's not, it's what that customer needs."* (AM1)

The findings also indicated that belonging tensions persist in Stage 3. Based on the analysis, the service functions were found to experience tensions relating to the competing demands of suddenly being assigned with strategic-level responsibilities (i.e. driving the service strategy), while simultaneously having to deliver the wide range of the previously existing and new service offerings.

In addition, organising tensions emerged in Stage 3, exemplified by the competing demands of the product business' practical aspects and the implementation of the outcome-based service offerings. Independent product and service innovation cycles were shown to create tensions in this

implementation stage, for the service implementation has to rely on the prior roll-out of the required product line, as explained by the SpeedCo representative:

> *"The challenge we have now is that all the focus on R&D is about trying to get those products refreshed and, therefore, there's not a lot of capacity if we were to go back and say, actually, let's now put the [IoT cloud part of the offering] onto the existing products. There's not a huge appetite or capacity to do that, given that those products will be discontinued very shortly. So, we're… in this Catch 22, we haven't got the [new line] products, and we have to wait for them, and that's a factor that's probably slowed down adoption of the [IoT cloud part of the offering]."* (SM3)

The analysis also provided instances of performing tensions in Stage 3. With their focus on scaling the outcome-based service offerings, manufacturers identified how the various service delivery efforts, and the required integration of the product business, have an effect on the established processes within the product business. Furthermore, representatives described how the success of the product business, perceived as a "safe bet", can limit the appetite to fully commit to servitization, as manufacturers require the product business to be successful in order to provide the financial resources to invest in the development of outcome-based services.

5 DISCUSSION AND CONCLUSION

The study set out to expand the investigation of paradoxes in servitization from a static to a processual perspective, in order to understand *what paradoxical tensions manufacturers face as they progress in their servitization journey*. The application of the conceptual framework to analyse three servitization journeys yielded insights into the effect the servitization process has on the emergence of varying paradoxical tensions. As a result, several important contributions to the theory and practice of servitization have been made.

5.1 PARADOXICAL TENSIONS IN SERVITIZATION

The analysis of the servitization journeys identified 24 paradoxical tensions (Lewis, 2000; Smith and Lewis, 2011) that cover the four organisational paradox categories, namely: learning, performing, organising and belonging (Smith and Lewis, 2011; Lewis, 2000). The findings not only confirm the applicability of the organisational paradox categorisation to the servitization domain (Kohtamäki et al., 2020a; Kohtamäki et al., 2018; Toth et al., 2020), but further uncover how the paradoxical tensions emerge at different servitization stages and vary in the specific contradictions they highlight.

5.1.1 Learning tensions

The findings identified the learning tension – which exposes the competing demands of exploiting established knowledge and building up new frame-breaking knowledge (Lewis, 2000) – as the most prevalent category of paradoxical tensions across the servitization journeys. Arguably, servitization, which takes manufacturers from a well-understood to a little-understood knowledge domain (i.e. product business to service business), creates particularly demanding learning needs, relative to other transformations (e.g. mergers, restructuring) (Bustinza et al., 2017), which explains the preponderance of the learning tensions identified. However, while, on the surface, product and service business orientations are oppositional, in a servitization context they are consistently interdependent, the result of which is that manufacturers have to constantly source, combine and integrate new knowledge from both parts of the business into functional systems to support the development and delivery of outcome-based service offerings (Valtakoski, 2017).

Our findings identified the learning tension as the only category that was widely experienced in Stage 1 of the manufacturers' servitization journeys (i.e. their initial exploration of the servitization concept). Its prevalence in Stage 1 (and, conversely, the absence of other tensions in this stage) highlights the incongruity of the servitization concept for manufacturers: servitization at this early stage is predominantly a learning exercise (Baines et al., 2020), and the individual instances of the learning tension identified show the evident competing demands of investing in the initial learning process in respect of servitization (which is still outside the organisational remit), or investing in further learning relating to the core product business (which is the focal point of the organisation).

Interestingly, as the manufacturers progressed towards Stage 2 (i.e. developing outcome-based services), our findings indicate how the learning tensions shifted from competing product and service business demands to competing demands within the service business itself. The development of outcome-based service offerings exposes the service-related knowledge gaps that the manufacturers need to fill, with the identified instances highlighting tensions relating to knowledge sourcing (i.e. external knowledge-acquisition vs. internal development); knowledge prioritisation (i.e. digitalisation expertise vs. customer expertise); or knowledge sequencing tensions (i.e. prioritising learning from delivery of intermediate offerings vs. piloting high value offerings) that have been identified elsewhere (Baines et al., 2013).

Yet, our findings showed that, in Stage 3 (i.e. implementing services and demonstrating their value), the focus of learning tensions returns to the competing demands of product and service businesses identified in Stage 1. Confirming the findings of Kohtamäki et al. (2020a), investment decisions at this point in the servitization journey bring to the fore tensions between the product and service businesses

(i.e. developing the core product business vs. further refining the service business). Importantly, although these investments appear as if they are based on competing demands, they are, in fact, equally necessary in a context where success is defined by the effectiveness of integrating products and services (Raja et al., 2018).

5.1.2   Belonging tensions

The findings also identified early instances of the "belonging" tension in servitization journeys, highlighting conflict between product and service identities (Lewis, 2000). The prevalence of the belonging tension underlines the implications that servitization creates for manufacturers across the transformation stages (Weeks and Benade, 2010). Yet the findings not only underscore the contradictions between product and service identities, but also their often neglected interdependence in a servitization context: outcome-based services compete as much on their commitment to service excellence as they compete on the quality of the product on which they are based (Qi et al., 2020).

The analysis identified instances of the belonging tension emerging in Stage 1 in only one case, which exemplified the implied mindset change as the manufacturer redefined services from being a distraction to an opportunity that should be embraced. However, in Stage 2, where the manufacturers focused on the development of specific outcome-based services, instances of belonging tensions were felt more widely. The process of actively starting to work towards apparently contradictory goals (product vs. service developments) and allocating formal roles and responsibilities contributes to the surfacing of the identity challenges that other studies have explored (Lenka et al., 2018b).

Our findings for Stage 3, where manufacturers seek to start scaling and delivering their service offerings, showed that, like the findings of Gebauer and Friedli (2005), the challenges of sustaining the synergy between product and service mindsets continue to surface belonging tensions. In addition, the findings highlighted other aspects of belonging tensions, in particular how servitization expands the responsibilities of the service business, which increasingly has to bridge the tension between fulfilling operational and strategic roles.

5.1.3   Organising tensions

The findings also identified organising paradox tensions, which present the challenge of structurally separating service and product businesses (Kohtamäki et al., 2018), and are prevalent across Stage 2 and Stage 3 of the manufacturers' servitization journeys. While the organising tension in some research (e.g. Jarzabkowski et al., 2013) is shown to trigger other tensions, its temporal surfacing delay in our data challenges this notion in the servitization context. Our findings suggest that manufacturers first engage in extensive learning (which surfaces learning tensions), before engaging in organisational and logistical processes that create organising tensions (Lüscher and Lewis, 2008).

Since initial explorations do not require organisational readjustments, no organising tensions emerge in Stage 1. The organising tensions were shown to come to the fore in Stage 2, as the development of specific outcome-based service offerings requires careful deliberation in respect of where to allocate responsibilities for their developments, considering the cross-functional and multi-actor collaboration required (Oliva et al., 2012). However, two additional organising tensions emerged in the analysis of Stage 3, where manufacturers work to deliver their service offerings across multiple product lines and geographies: organising tensions related to the allocation of the servitization responsibility (i.e. product vs. service business) and structural contradictions related to different innovation drivers in servitization (i.e. top-down vs. bottom-up innovation). Following on from the development of initial outcome-based services, servitization implies a process of continuous confluence and interdependence of product and service innovations (Opresnik and Taisch, 2015), which requires manufacturers to consider structures and processes that accommodate their inherent contradictions.

5.1.4 Performing tensions

The findings also identified the performing paradox, where manufacturers work towards bridging short-term and long-term targets (Smith and Lewis, 2011), as the category of paradoxical tension that is prevalent across Stage 2 and Stage 3 of the manufacturers' servitization journey.

Similar to the organising tensions, performing tensions emerge in Stage 2 of servitization, where manufacturers co-develop specific outcome-based service offerings (Baines et al., 2020). It is interesting to note that the tensions identified at this stage go beyond the exploration vs. exploitation dichotomy, commonly linked to performing tensions (Smith et al., 2014). The findings highlight the importance of focusing on the design of the offering and also on the design of the performance targets, in order to stimulate important cooperation between the product and service businesses and avoid the creation of conflict (Jarzabkowski and Lê, 2017). Interestingly, the Stage 3 findings, where manufacturers sought to implement service solutions at scale, revealed how the scaling-up of the service business is perceived as a threat to product operations; but also demonstrated, conversely, how the success of the product business reduces the support for the development of the service business. However, the health of the product business is essential for providing the resources to make the necessary investment in the service business.

5.2 CONTRIBUTIONS TO THEORY AND PRACTICE

5.2.1 Contributions to servitization theory

The study and its findings contribute to the servitization literature in different ways. First, the study introduces a processual perspective to the research of paradoxes in servitization by developing a

conceptual framework that integrates the Baines et al. (2020) servitization model and Smith and Lewis's (2011) organisational paradox conceptualisation. This specific processual focus of the framework expands the prior paradox research targeting fully servitized manufacturers (Kohtamäki et al., 2020a; Toth et al., 2020) by showing: i) how the stage of the manufacturer's servitization journey impacts the paradoxical tensions that are experienced; ii) how certain paradoxical tensions already surface in the early stages of the servitization journey when servitization ideas are only initially explored before any formal adoption decision; iii) how the amount and variety of paradoxical tensions increases in the course of the servitization journey. With these contributions the research, therefore, directly answers calls for the development of a processual understanding of paradoxes in servitization (Toth et al., 2020) and servitization in general (Brax and Visintin, 2017).

Second, the study significantly expands the range of paradoxical tensions that research can draw on to theorise upon the competing demands servitization creates within manufacturing organisations. While prior research predominantly focused on confirming the applicability of organisational paradoxes in a servitization context (Kohtamäki et al., 2020a; Toth et al., 2020), the current study shows how the underlying tensions may surface in different guises (e.g. learning tensions may surface in relation to learning about servitization, or learning about effective service delivery). The findings thus provide insights into the range of paradoxical tensions that are specific to the servitization context.

Third, the study also contributes to laying the foundation for the development of a cumulative research tradition for future examination of paradoxes in servitization. By explicitly integrating the emerging theorisation of servitization stages (Baines et al., 2020) with established paradox theory (Smith and Lewis, 2011) and its servitization-specific application (Kohtamäki et al., 2018), the study strengthens the theoretical consistency within future servitization research and facilitates comparability of future research findings with those of other research domains (Grover et al., 2006).

5.2.2 Contributions to servitization practice

The present study also contributes to the advancement of servitization practice. It is widely accepted that an awareness of the paradoxes' existence (Smith and Tushman, 2005) and their timely recognition (Wakayama and La Pierre, 2017; Miron-Spektor et al., 2011) are key to their effective management. This study not only provides illustrations of the specific paradoxes that may be encountered in the course of the servitization journey, but also an understanding of when the corresponding tensions might emerge. The processual perspective on paradoxes in servitization provides decision-makers with the ability to anticipate the emergence of the paradoxical tensions and adopt active approaches for their management (Kohtamäki et al., 2020a; Lüscher and Lewis, 2008). Considering the diverse range of paradoxical tensions identified, an active approach should extend across the entire servitization

journey and involve a mixture of well-coordinated initiatives to fundamentally reframe the perceived contradictions between product and service businesses in a servitization context.

Of critical importance in this context are initiatives that support the learning about servitization in order to educate on the service-product interdependency and the shared opportunity it provides for the manufacturer. Given that the learning tensions emerged early on in our research, it is critical that these initiatives start early in the exploration stage, involving a wide range of stakeholders (service and product teams), in order to pre-empt an alternative confrontational framing to become established.

Moving beyond learning initiatives, an active approach to managing the paradoxes in servitization should also involve early coaching and mentoring sessions to create an open dialogue and group discussion in the organisation, and help individuals to understand their position within the new context (directly addressing the organising and performing tensions). Manufacturers will likely modify their organisational structures and targets in the course of their servitization journey and the value of coaching and mentoring initiatives to help individuals prepare themselves for these kind of changes have been shown to be significant (Maalouf and Gammelgaard, 2016). Also of importance would be secondment initiatives to encourage product and service staff to experience the interdependency between products and services in a servitization context, and support the formation of identities that go beyond the product-service divide.

5.2.3   Limitations

However, despite its contributions, several limitations of the study need to be acknowledged. First, although a large number of interviews were conducted, the study is limited to three companies and additional cases may have further expanded the findings. Importantly, despite considerable efforts, no case data could be collected on the final stage of servitization, which reflects the observation that very few manufacturers are yet to effectively compete on outcome-based services at scale (Baines et al., 2020). Further, the study followed a variable-oriented strategy (Miles et al., 2014), focusing on the broad patterns found across a variety of cases and, naturally, less explicit case-to-case comparison that would be done in a case-oriented strategy, potentially omitting some of the interesting case-specific aspects.

Second, despite drawing on longitudinal data collected over several years, the study still had to rely on retrospective reporting to capture the early servitization stages, which may create concerns over data quality (Huber and Power, 1985). Additional primary and secondary data sources and multiple informants across different functional groups (Andriopoulos and Gotsi, 2017) were used to mitigate these effects. Third, deductive analysis using established organisational paradox categorisation (Smith and Lewis, 2011) and servitization stages (Baines et al., 2020) may have limited the breadth of the

analysis (Cunha and Putnam, 2019); future research should consider engaging grounded theory approaches (Strauss and Corbin, 1997) to overcome this limitation.

5.2.4   Opportunities for future research

Despite these limitations, the study offers several opportunities for further research. In particular, while the present research investigated paradoxical tensions at an organisation level, future research should also advance individual-level perspectives that develop insights into the cognitive implications of paradoxes (following Lenka et al., 2018a). The present processual perspective provides an opportunity to not only examine how servitization creates paradoxical tensions for individuals but, importantly, how the various stages may affect individuals in their roles in different ways.

Future research could also use the processual perspective to build on the findings of Kohtamäki et al. (2020a) regarding the active management of the paradoxical tensions in servitization by investigating the applicability and effectiveness of these management approaches at different transformation stages. The present study and its findings should also help future research to better understand the interdependence between servitization and digitalisation paradoxes (Gebauer et al., 2020; Kohtamäki et al., 2020b). As both transformation processes are highly interdependent (Kharlamov and Parry, 2020; Coreynen et al., 2017), it would be a promising approach to explore their dynamic interactions and the effectiveness of shared management approaches. By advancing a processual perspective on paradoxes in servitization, the present study lays the foundation for these future research opportunities.

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