### PARADOXES IN INTEGRATED SOLUTIONS

Authors: Suvi Einola, Rodrigo Rabetino, Marko Kohtamäki, Seppo Luoto

### **Abstract**

When implementing transitions to provide solutions, companies may face a service paradox – a circumstance in which contradictory and connected tensions exist concurrently. This study contributes to the literature on industrial service transition by applying organizational paradox theory to understand the paradoxes faced by servitizing manufacturing companies. By applying the comparative case study methodology (33 interviews in 5 case companies and an analysis of vast documentary data), this study recognizes four paradoxes of servitization in the dimensions of learning, organizing, performing, and belonging and also recognizes six tensions between paradoxes, which lead to the creation of new paradoxes. For researchers, this study contributes by developing an approach to analyze the paradoxes of service transformation; for managers, this study provides a valuable tool to analyze and overcome the challenges faced during service transformation.

**Keywords**: Paradox, service paradox, integrated solutions, organizing, servitization, industrial services.

# **Competitive paper**

### **ACKNOWLEDGEMENTS**

This paper is a product of the Fimecc S4Fleet research project. The financial support of the Finnish Funding Agency for Technology and Innovation (TEKES) and the Federation of Finnish Technology Industries is gratefully acknowledged.

### 1. Introduction

"By 2002, upper-level bosses were already talking about being a solution provider. On the path of becoming a solution provider, we have taken steps forward and, every now and then, steps backward, and one very crucial issue that our management team has had much difficulty with is to understand that putting together different components and offering them to customers, that's not being a solution provider; you are just delivering components..." (General Manager, Case A)

Transforming an industrial company to implement servitization is far from simple, and successful manufacturing firms have been known to struggle with service transformation (Brady, Davies, and Gann 2005; Galbraith 2002; Visnjic, Van Looy, and Neely 2013). While servitization research has expanded significantly in the past two decades (Lightfoot, Baines, and Smart 2013), it has been argued that a variety of factors – including environmental factors, path dependency and inertia, organizational culture, and misunderstood customer expectations – have constrained or even prevented service transitions (Oliva & Kallenberg 2003; Martinez et al. 2010; Gebauer & Friedli 2005; Gebauer & Fleisch 2007). These barriers can lead to a development known as the service paradox (Brax 2005; Gebauer, Fleisch, and Friedli 2005), which may not only slow but also prevent – or even reverse – servitization (Finne, Brax, and Holmström 2013). With recent scholarship documenting cases of reversions in servitization, there are doubts regarding the unidirectional progression of servitization described in the literature (Finne, Brax, and Holmström 2013; Kowalkowski et al. 2012).

The "service paradox", as developed in Gebauer et al. (2005), is a useful conceptual metaphor that was originally proposed as a tool to illustrate and discuss specific barriers preventing successful servitization. Although there may be multiple reasons for the failure of servitization, the paradoxical tensions behind the service paradox metaphor remain unexplored and represent a clear research gap. Defined as "contradictory yet interrelated elements that exist simultaneously and persist over time" (Smith & Lewis, 2011, p. 386), paradoxical tensions frequently result in difficulties during organizational transformations. As servitization may involve important opportunities for manufacturers, this research gap must be addressed by studies applying paradox theory to analyze the tensions arising in the service transformation of industrial companies. As suggested by Lewis (2000, p. 764), managers "need to recognize, become comfortable with, and even profit from tensions and the anxieties they provoke". Thus, there is a need to shed light on those organizational paradoxes that can impede or prevent successful servitization.

The present study aims to add to our understanding of industrial service transformation by reconceptualizing the service paradox metaphor. Thus, this study addresses the following research question: How do the paradoxes between organizational practices constrain the servitization of manufacturing companies? Applying paradox theory (Smith and Lewis 2011) and data from five leading Finnish manufacturing companies, the present multiple-case study contributes to the literature on industrial service transformation by recognizing paradoxes and tensions that impede or prevent servitization. This study discusses the tensions involved in servitization and contributes to developing theoretical understanding regarding industrial service transformation. For managers, this article illustrates key tensions that companies have encountered during this

transformation. In particular, we develop a framework that manufacturing companies can utilize to understand and cope with the paradoxes and tensions of servitization.

### 2. Theory

# 2.1. The challenges and tensions in the transformation toward integrated solutions

Manufacturers have been transitioning from product-centric offerings consisting of goods and add-on services to bundling goods and services as integrated solutions (Matthyssens and Vandenbempt 2008; Sawhney 2006). These integrated solutions are extensions of the modular business model, in which manufacturing firms add consultancy and advanced services to a broad spectrum of standardized components and compatible interfaces that are easily reconfigured into customized bundles (Davies, Brady, and Hobday 2006, 2007). As a consequence, integrated solutions typically consist of 24/7 long-term services that range from training and the provision of spare parts, repairs, and maintenance to more advanced services, such as remote servicing, operational and performance services, and turnkey projects (Brady, Davies, and Gann 2005; Davies, Brady, and Hobday 2006).

Previous research offers an extensive list of challenges that manufacturers may face in moving toward solutions-based business logic. The service transition often requires the implementation of new service-oriented organizational structures (Galbraith 2002; Gebauer et al. 2010; Hull 2004; Neu and Brown 2008; Oliva and Kallenberg 2003) and mindsets (Fischer et al. 2010; Galbraith 2002; Karpen, Bove, and Lukas 2012; Matthyssens and Vandenbempt 2010). In

particular, fashioning an embedded product-service culture and strategic alignment that includes establishing instruments for bridging product and service business units are challenging but necessary conditions of service transition (Gebauer, Fleisch, and Friedli 2005; Gebauer and Fleisch 2007; Johnstone, Dainty, and Wilkinson 2009; Martinez et al. 2010; Storbacka et al. 2013). At the level of organizational culture, concepts such as low service orientation (Allmendinger and Lombreglia 2005; Bowen, Siehl, and Schneider 1989), a product-manufacturer's cultural habits (Gebauer, Fleisch, and Friedli 2005), organizational inertia (Brady, Davies, and Gann 2005), a transaction-oriented business philosophy (Brax 2005), an embedded manufacturing culture (Martinez et al. 2010) and manufacturing-driven microfoundations (Kindström, Kowalkowski, and Sandberg 2013) can present obstacles to service infusion.

Cognitive barriers are also significant (Gebauer, Fleisch, and Friedli 2005; Gebauer and Friedli 2005). Studies show that the product-based cognitions of managers (Allmendinger and Lombreglia 2005), sales personnel (Neu and Brown 2005; Rothenberg 2007), service personnel (Turunen and Toivonen 2011) and customers (Matthyssens and Vandenbempt 2010) can lead to risk aversion (Gebauer, Fleisch, and Friedli 2005), failure to recognize productive opportunities (Cohen, Agrawal, & Agrawal, 2006; Spring & Araujo, 2013) and/or "a lack of belief in the economic potential of service business" (Gebauer, Fischer, and Fleisch 2010, p. 594). Quinn, Doorley and Paquette (1990) conclude that many manufacturing companies have encountered difficulties in identifying their own value-adding activities that might form the basis for building integrated solutions for customers. Even after having identified such activities, it has also been posited that many manufacturing companies are oblivious to their customers' real needs

(Anderson and Narus 1995) or are incapable of quantifying and presenting those customer benefits related to integrated solutions (Töytäri et al. 2011; Visnjic, Van Looy, and Neely 2013).

Likewise, these companies might lack the knowledge regarding how to develop new services (Gremyr, Löfberg, and Witell 2010), how to combine them into product-service bundles (Davies, Brady, and Hobday 2007) and "objectify them at some point in time during the procurement process" (Lindberg and Nordin 2008, p. 229) in a cost effective manner (Pawar, Beltagui, and Riedel 2009). As a result, developing close long-term relationships with customers to co-produce services and anticipate future needs represents another significant challenge in servitization (Anderson and Narus 1995; Baines and Lightfoot 2014; Galbraith 2002; Johnstone, Dainty, and Wilkinson 2009; Ordanini and Parasuraman 2011). In addition, studies have also stressed that acquiring new capabilities and expertise (Brady, Davies, and Gann 2005; Gebauer 2011; Martinez et al. 2010; Mathieu 2001; Paiola et al. 2013), and rethinking the vertical scope and boundaries of the company (Baines, Lightfoot, Benedettini, et al. 2009; Davies 2004) while developing service networks and supplier relationships (Martinez et al. 2010; Oliva and Kallenberg 2003; Storbacka et al. 2013; Windahl and Lakemond 2006) constitute substantial challenges in servitization.

The challenges of industrial service transformation echo tensions between the product and service cultures (Gebauer and Friedli 2005), product and service business units (Auguste, Harmon, and Pandit 2006; Oliva and Kallenberg 2003), and standardization and customization (Sawhney 2006), which suggests that the challenges of servitization should be analyzed through the lens of paradox. For instance, Miller et al. (2002, p. 6) highlight the need for "managing"

tensions and exploiting complementarities between client needs and capabilities". In addition, Kowalkowski, Kindström and Brehmer (2011, p. 185) conclude that service infusion in global business markets involves managing the tension between "an in-house service organization and working through local service partners". These scholars also highlight the importance of balancing exploitation and exploration in both product and service businesses.

Companies may also face tensions between separation and integration during servitization (Oliva, Gebauer, and Branm 2012). Thus, to protect emerging service cultures from their strong emphases on manufacturing, companies tend to separate their product and service business units (Auguste, Harmon, and Pandit 2006; Jacob and Ulaga 2008; Oliva and Kallenberg 2003; Raddats and Burton 2011) while simultaneously experiencing the need to integrate their product and service business units to create and leverage internal synergies and to provide customers with a single point of contact (Neu and Brown 2005). Regarding organizational structure, Eisenstat, Foote, Galbraith and Miller (2001) propose an opportunity-based design as an effective structure with which to manage the tension between an entrepreneurial market's responsiveness and an integrated organization that benefits from economies of scale.

Moreover, the "tension between a service and a product/manufacturing culture is likely to be a constant challenge" (Daniel Kindström and Kowalkowski 2009, p. 157), since the business logics of services and products vary substantially (Gebauer, Fleisch, and Friedli 2005). In addition, extra tensions are related to balancing the two important trade-offs of increasing a product's quality, which may reduce service revenues, and increasing service quality, which may reduce the sales of new products as a result of extending the product's useful life (Oliva and

Kallenberg 2003). Visnjic, Van Looy and Neely (2013, p. 111) refer to the latter trade-off as product cannibalization, which leads "to tensions between those responsible for product revenues and those responsible for service revenues". As Gebauer et al. (2005, p. 14) note, "[w]here there is such a paradox, substantial investment in extending the service business leads to increased service offerings and higher costs, but does not generate the expected correspondingly higher returns."

# 2.2. Paradox theory

Reflecting co-existing tensions (Poole and van de Ven 1989), organizational paradox juxtaposes organizational opposites and suggests that an organization must cope with tensions (Calton and Payne 2003; Jay 2013). By definition, a paradox indicates that a company cannot cope with organizational tensions by choosing "either-or" but must instead accept a given situation and cope with "both-and". In the previous organizational literature, paradoxical tensions have been identified using several themes. For instance, the innovation literature has concluded that organizations must develop capabilities to balance between exploration and exploitation to achieve organizational ambidexterity (Raisch and Birkinshaw 2008). Similarly, in the field of organizational networks, researchers have debated whether to use price, authority or social governance for network coordination (Adler 2001; Powell 1990) and have suggested the use of hybrid governance structures to balance these mechanisms (Andriopoulos and Lewis 2010; O'Reilly and Tushman 2011; Smith, Binns, and Tushman 2010).

When considering the variety of means by which organizations can cope with paradoxical tensions, studies suggest that organizations must accept, appreciate, make sense of, and cope with paradoxes (Beech et al. 2004; Lewis 2000; Poole and van de Ven 1989). In addition, when addressing paradoxes, companies may stretch mechanisms to cope with tensions and explore integrated solutions while exploiting the "spare parts business" in maintenance and after-sales functionalities. Companies may also choose to eliminate or avoid the paradox by separating (by space and/or time) new service innovation programs from the efficient exploitation of product-services by focusing at times on explorative service innovation programs (Poole & Van de Ven 1989; Beech et al., 2004). Finally, because a paradox can rarely be solved, companies must balance and stretch resources to meet the contradictory demands presented by paradoxes.

Building on the paradox literature and creating a unified framework to integrate the vast amount of research on a variety of organizational tensions, Smith and Lewis (2011) (see also Lewis 2000; Lüscher and Lewis 2008) identified four dimensions of organizational paradoxes: a) *learning*, b) *organizing*, c) *performing* and d) *belonging* (Figure 1). These dimensions may include several different paradoxes, and a variety of tensions can be found in between them. The framework also provides an approach to search for paradoxes and tensions that have an impact on the organizations studied. *Learning paradoxes* refer to organizational systems that tend to renew and change while simultaneously intending to maintain some element or elements from the past. Lewis (2000, p. 766) defines it as follows: "A key source of learning paradoxes is tension between old and new—a struggle between the comfort of the past and the uncertainty of the future". Similarly, a learning paradox can reference a tension between radical and

incremental innovation. When both are needed, they compete for the same resources, and an organization frequently must stretch to achieve both (Smith and Lewis 2011).

Figure 1 Categorization of organizational paradoxes and tensions

#### Learning::Organizing Learning::Belonging Learning Organizational routines and Conflicts between the need for Efforts to adjust, renew, change, and innovate capabilities seek stability, clarity, adaptation and change and the foster tensions between building upon and focus, and efficiency while also desire to retain an ordered sense of enabling dynamic, flexible, and agile destroying the past to create the future self and purpose(e.g., Fiol, 2002; Ibarra, 1999; (e.g., March, 1991; Senge, 1990; Weick & outcomes O'Maho ny (e.g., Eisenhardt & Martin, 2000; Teec e Quinn, 1999) & Bechky, 2006) & Pisano, 1994) Belonging::Organizing Tensions between the individual and Organizing the aggregate, individuality vs. Structuring and leading foster collaboration **Belonging** and competition, empowerment and collective action Identity fosters tensions between the direction, and control and flexibility (e.g., Adler, Go l do ftas, & Levine, 1999; individual and the collective and between (e.g., Andriopoulos (e.g., Murnighan & Lewis, 2009; Dweck competing values, roles, and memberships (e.g., Denison, & Conlon, 1991; Hooijberg, & Quinn, 1995; Flynn & Chatman, Badaracco, 1998; Brewer, 1991; Huy, 2002; 2006; Tushman & Smith & Ber g, O'Reilly, 1996) Markus & Kitayama, 1991; Pratt & Foreman, 1987) 2001; 2000) Building capabilities for the Ghemawat & Costa, 1993; Luscher & Lewis, future while ensuring success in 2008: the present Siggelkow & Levinthal, 2003) Learning::Performing Performing::Belonging Performing::Organizing Performing Clash between identification and Plurality fosters multiple and competing Interplay between means and ends, goals as actors negotiate individual goal as stakeholders seek divergent employee vs. customer demands, high identities with social and organizational success(e.g., Denis, Langley, & commitment vs. high performance (e.g., occupational demands(e.g., Dukerich, Golden, Eisenstat, Beer, Foote, Fredberg, Rouleau, 2007; Donaldson & Preston, 1995; Jarzabkowski & & Norrgren, 2008; Gittell, 2004; Kaplan Shortell, 2002; Kreiner, Hollensbe, & Sillince, 2007; Margolis & Walsh, 2003) & Norton, 1996) Sheep, 2006)

SOURCE: Smith and Lewis (2011: 383)

Emerging from competing organizational mechanisms, *paradoxes of organizing* consist of conflicts between routine and change, direction and empowerment, and/or control and flexibility (Smith and Lewis 2011, p. 384). Highlighting co-existing tensions that persist over time, organizations must cope with these types of paradoxes that require the simultaneous facilitation

of change and routine, that expect participation when creating direction or that demand tight control of certain tasks while increasing flexibility in others.

The competing interests of stakeholders may facilitate the emergence of competing performance targets (Smith and Lewis 2011, p. 385), which are known as *paradoxes of performing*. For instance, tensions may emerge between functional targets and organizational-level targets, between product and service organizations, or between individuals and functional targets. Thus, interests and goals may clash when different stakeholders drive their interests by influencing organizational performance management systems and target setting. Moreover, to reflect and identify the competing objects of identification, self, team, customer relationship and the company, the model employs the concept of *belonging*. "Tensions between self and other are the crux of belonging paradoxes" (Lewis 2000, p. 769). These paradoxes can be generated by a specific professional identity that contrasts with organizational targets, such as an engineering identity that contrasts with the customer orientation of a company.

As there are multiple paradoxes that co-exist within an organization, tensions may also be created between paradoxes (figure 1). Paradoxes of learning and organizing create tension when an organization is searching for change while simultaneously facilitating effective operation through structures. In the service business, tension may be created within organizations when they move toward customer solutions while maintaining separate product and service units. Tension between organizing and performing may emerge because structures are intended to maintain stability, whereas performance targets search for improvements and higher performance. Paradoxes of performing and belonging may conflict when identity and

performance targets clash. This clash may be relatively common in knowledge-work – an area in which professional identity and creativity may be appreciated above performance – because organizations that embrace creative professionals may also expect performance targets to be achieved. Finally, learning, which facilitates organizational change and renewal, may create a tension with identity, which highlights a sense of self and purpose. Whereas identity may facilitate stability and inertia, learning underlines the need for transition.

Accepting the view that paradoxes are rarely resolved, and considering paradox as a theoretical lens, the present study extends the industrial service literature by conceptualizing the industrial service paradox to accommodate the challenges of industrial service transformation, such as servitization. Although the paradox approach has been utilized in teams (Statler, Heracleous, and Jacobs 2011) and organizations (Golden-Biddle and Rao 1997; Jarzabkowski and Sillince 2007; Roberts 2002), it has not been utilized to analyze the challenges of servitization in solution provider companies.

# 3. Methodology

### 3.1. Research strategy

This article uses a multiple-case study approach to analyze the paradoxes that five leading corporations faced during servitization. Case studies are a suitable tool when examining phenomena that have not been extensively analyzed (Leonard-Barton 1990). Moreover, the use of case studies is a valid strategy to exhaustively explore issues that are difficult to replicate (Dubois and Araujo 2007; Dyer and Wilkins 1991; Eisenhardt and Graebner 2007; Siggelkow

# 3.2. Case selection and sample

The empirical part of this article includes data from five Finnish industrial corporations in the metal and machinery industries. Using a straightforward purposeful sampling approach, this research focuses on manufacturing firms that have executed active servitization strategies while continuing to redesign their offerings to introduce customer solutions. We found that these firms are suitable examples to clarify the issues under consideration in this study (Eisenhardt and Graebner 2007; Yin 1994) and are "information-rich" cases that are worthy of detailed exploration (Patton 2002, p. 231). Next, we present some basic information about each case company and case-specific findings to enhance the subsequent cross-case analysis.

### 3.2.1. CASE A

CASE A is a large Finnish international company that delivers power solutions to the marine and energy markets. In 2012, CASE A generated net sales of 4,725 million Euros. The company consists of three business units: marine solutions, power plants, and services and support. In 2012, CASE A services generated 40% of the company's total net sales. This study focuses on the company's marine industry services. CASE A's products include complete propulsion delivery systems and spare parts, and the company offers operations and maintenance services for the entire life cycle of its installations. The company's largest marine market opportunities lie in environmental and fuel-efficient solutions.

### 3.2.2. CASE B

CASE B is a Finnish international company that delivers lifting equipment and related services in 47 countries to a broad range of customers, including companies in the manufacturing and process industries, shipyards, ports and terminals. In 2013, CASE B generated 2,099 million Euros in net sales – with 40% generated in the service business – and its operating profit was 115.5 million Euros. CASE B offers its customers a variety of service programs consisting primarily of a variety of consultation- and maintenance-related services.

### 3.2.3. CASE C

CASE C is a large Finnish global technology and service supplier that serves customers in the pulp, paper, and power industries. Last year, CASE C generated 2,703 million Euros in net sales, 38% of which was derived from the service business, while its target markets generated 11.3 billion Euros. Its operating profit was 189.2 million Euros. CASE C offers a range of production lines, expert services, and maintenance services that involve spare and wear parts and consumables.

### 3.2.4. CASE D

CASE D is a Finnish international company that develops technologies and services for the metal and mineral processing industries. More than 80% of its sales are generated through its core businesses, and its remaining sales are increasingly generated in the energy, chemical and industrial water treatment industries. In 2012, CASE D generated net sales of 2,087 million Euros. The company operates globally in four business areas: nonferrous solutions, ferrous solutions, energy, and light metals and environmental solutions and services. The first three areas

involve delivering technological solutions to customers in the mineral and metal industries, and the last area focuses on industrial services. Service-related sales account for 23% of CASE D's sales. CASE D offers services and service solutions with respect to spare parts, maintenance and technical services, modernization, and operations. In the metal and mineral processing industries, the company's investment decisions are increasingly driven by environmental and energy-efficiency factors. This strategy increases the demand for advanced technologies and sustainable solutions for mineral and metal processing.

### 3.2.5. CASE E

CASE E is Finnish international company and a global leader in the elevator and escalator industry. It has over 1,000 offices in 50 different countries and over 39,000 employees worldwide. In 2013, the company's net sales were 6,932 million Euros, with an operating profit of 784 million Euros. CASE E's versatile product portfolio features a wide range of innovative products, including elevators, escalators, auto-walks, automatic doors, and monitoring and access control systems. In connection with these products, CASE E offers a portfolio of services that range from design and construction to maintenance and modernization of buildings.

### 3.3. Data collection and analysis process

Adopting a synthesizing practice (Kindström and Kowalkowski 2014; Storbacka et al. 2013), this study combines existing interview data to identify the main paradoxes that the companies analyzed hereunder faced during servitization. We analyzed 33 face-to-face interviews (a total of 649 transcribed pages) to understand the core paradoxes that firms faced during servitization. Interviewees were selected from several organizational levels based on their knowledge and

involvement with industrial services. Executives from different business units allowed us to conduct a detailed exploration of the diverse tensions that arose during servitization. The interviews were recorded and transcribed verbatim directly after each meeting. To guarantee the anonymity of the firms and interviewees, cases and verbatim quotations are identified using codes. Table 1 presents additional details of the interviews.

This research followed a process that moved from descriptive to explanatory phases and from concrete to abstract understandings (Huberman and Miles 1994). First, we listed the key tensions and the main paradoxes faced by the case companies after coding the interviews consistent with the dimensions involved in the theoretical model, which resulted in a within-case table. Then, to isolate patterns across the analyzed companies, we conducted cross-case analyses (Eisenhardt 1989; Huberman and Miles 1994), while assessing whether previously recognized tensions and paradoxes were present in each company and how they affected servitization processes in the different firms. Content and thematic pattern-matching analyses were utilized to explore the data (Yin 1994).

To increase the validity of this research, the interviews were complemented with other sources of information (e.g., internal documents, company presentations, and annual reports). Triangulation of passive and active data (Dubois and Gadde 2002) was applied as a mechanism to recognize the core tensions and paradoxes during servitization, to verify the exactitude of the information (Yin 1994), and to increase the reliability of the study (Beverland and Lindgreen 2010). Finally, respondents from all the case companies reviewed a draft version of this study, further strengthening its validity (Gibbert, Ruigrok, and Wicki 2008; Yin 1994).

Table 1 Data description

Case	Dogmondontol titlos	Length of the interviews	
Case	Respondents' titles	Pages*	Minutes
	Pricing Manager, Services (AM9)	23	105
A	Vice President 1, Integrated Solutions (AM6)	17	79
	Director 1, Project Management (AM8)	9	50
	Vice president 2, Product Business Unit (AM4)	12	52
	Director 2, Strategic Business Development (AM7)	11	49
	Director 3, Business Intelligence (AM1)	8	45
	General Manager 1, Agreements (AM5)	21	80
	Director 4, Logistics (AM2)	18	76
	Vice President 3, Services (AM3)	14	66
	Director 5, Key Account Management (AM12)	28	105
В	Service Director (BM7)	12	70
	District Manager 1 (BM1)	18	80
	District Manager 2 (BM3)	19	90
	Area Manager (BM4)	19	85
	Director of product and services development (2 interviews) (BM6, 8)	46	235
	Global Category Manager (BM2)	15	38
	Product Manager (BM5)	24	61
	Director, Agreements (CM6)	28	63
	Service Business Development Manager (CM7)	28	84
С	Manager, Engineering and Project Management (CM2)	21	92
	Technology Manager (CM1)	46	138
	President, Service Business (CM4)	19	61
	Product Development Manager (CM3)	29	120
	Senior Manager, Concept Development (CM5)	32	145
D	Product Service Support Manager (DM1)	9	40
	Head of Services (DM2)	17	77
	Specialist, Life Cycle Costing (DM3)	16	76
	Director, Strategy and Sales Development (DM4)	19	80
	Branch Manager (EM1)	10	42
,	Area Manager (EM4)	11	50
E	Service Area Manager (EM2)	15	60
	Service Business Director (KM3)	35	60
OTAL		649	2554

SOURCE: Authors' own elaboration based on interviews.\* Single-spaced text, Times New Roman font, size 12.

# 4. Paradoxes and paradoxical tensions in integrated solutions

# 4.1. Paradoxes in integrated solutions

# 4.1.1. Paradoxes of organizing

"Organizing paradoxes surface as complex systems create competing designs and processes to achieve a desired outcome" (Smith & Lewis 2011, p. 383-384). The capability of maintaining efficient operations while adapting the organizational structure is at the very core of the paradox of organizing (Smith 2000). While organizational structures, routines and culture are important, they mostly tend to enable the exploitation of existing business lines, such as product manufacturing and base add-on services, rather than facilitating the development of new businesses such as providing integrated solutions. Whereas existing organizational structures and routines represent inertia and path-dependency as organizations build on their past (Davies & Brady, 2000), both structural and organizational culture constrain behaviors targeted at changing them (Lüscher and Lewis 2008; Poole and van de Ven 1989). While moving toward integrated solutions, the manufacturers analyzed hereunder struggled with the tension between the existence of separated product and service organizations and the need for collaboration to integrate products and services into customer solutions.

"...in our current structure, the backlog is generated by the cooperation among our business units. We have five business units that are still somewhat operating like silos..."

(CM5)

"The division is very strong in [company name removed] and when we talk about solutions, the solutions many times cross divisional borders. And that must change and that must be examined, and that's what we have seen coming." (AM8)

# 4.1.2. Paradoxes of belonging

The paradox of belonging is rooted in identity, values, and the roles of individuals when describing the tension between the self and the collective. For the cases analyzed in this study, the paradox of belonging led to tensions between the engineering-oriented identity of the individuals and the new identity, values and mindset that were intended to be developed in the solutions-oriented organization. A particular tension is created when individuals must simultaneously emphasize the importance of products, services and integrated solutions, and no disclosing decisions can be made. Thus, workers faced a tension when stretching their thinking from product- and engineering-focused thinking toward a value-based solutions approach (Ostrom et al. 2010). The paradox of belonging was reflected in a tension between a product-oriented culture and values and a culture oriented toward integrated solutions.

"Value thinking, this is a really big and necessary change in the organization, in other words, that we will not think that everything that we get from this is product-oriented. We must switch our thinking, and think about what the customer needs, what happens if the customer does not get this solution, and how much money will they lose. From that, we can then calculate the value and put a price tag on that solution. More looking from outside in than inside out. That's a big change." (AM9)

"Those people are completely different; they are acting more like a consulting organization, they have different cost structures and the people are different. When we talk about technicians, it's more like a sort of traditional service organization. This kind of

product engineering organization is more of an expert organization, but a process engineer organization is a very different type." (CM4)

# 4.1.3. Paradoxes of performing

Paradoxes of performing typically emerge from conflicting demands and targets in different organizational units and may lead to competing strategies and organizational politics. Based on the interviews, the paradox of performing involved competing goals, such as the emphasis on product and service business units vis-à-vis integrated solutions, which also indicates a tension between short-term and long-term objectives. For instance, short-term target setting in traditional business lines may contradict solutions that produce long-term results throughout the product lifecycle, instead of providing so-called quick wins. Thus, the solution providers analyzed hereunder faced a paradox when intending to establish long-term stable revenues while rapidly growing short-term revenues.

"...we had to develop better and better solutions, better and better products that last longer, meaning we should develop spare parts that not only last five years, but maybe they should last ten years. And people said 'But, how can this be, it's bad for us. I mean business is going to go down if we develop better and better solutions'." (AM3)

"...as an organization, we have no patience to wait for these life-cycle projects; they take two, three, four, five years to materialize. And we are a corporation, a listed company, so we must show the results every quarter, so that's the slight dilemma." (AM12)

The interviewees also stressed the traditional paradox between differentiation and low-cost when discussing the need to compete with high-end products and low prices against low-end rivals. This is a paradox of performance too, when trying to stretch toward the highest differentiation with the lowest possible price.

"Our challenge has been that we sort of compete with high-market offerings in low-market areas. So, we have the world's best products but we compete against our competitors based on price." (BM2)

# 4.1.4. Paradoxes of learning

Organizations frequently fail to take action when they notice discrepancies between their present understanding and the operational environment around them. As Smith and Lewis (2011, p. 383) argue, "Learning paradoxes surface as dynamic systems change, renew, and innovate." In the cases analyzed in this study, the paradox of learning reflects tensions between exploiting traditional product manufacturing and service businesses and exploring new opportunities in integrated solutions. This paradox nears the concept of ambidexterity (Cohen and Levinthal 1990; Lewin, Massini, and Peeters 2010) – while exploiting and incrementally developing the core traditional businesses, the organization must stretch to explore and radically learn new business logic, such as integrated solutions (Gebauer, Fischer, and Fleisch 2010).

"It's a fundamental change really, going from only thinking about the technology, only thinking about the hardcore equipment to start thinking of all the services related to that and also to think about the customer from a different perspective and angle as well. Not

only think that the satisfaction from the on-time delivery and good high-quality equipment, but really, customer satisfaction comes from how well we are responding on small spares. How well we are responding to their big strategic decision making, consulting that part. So, the barrier really is internal for us, to change our behavior." (DM2)

"We have, of course, challenges now. I mean, in the past it was product knowledge, and if you have competent service people and spare parts, they can be utilized. Now, we do not necessarily have all the competence in all areas there, and this is something we are trying to improve..." (AM4)

Table 2 Paradoxes and paradoxical tensions in integrated solutions

	<u> </u>	<u>e</u>	
Naming	Dilemma	Paradoxes and tensions	Examples of coping initiatives
Organizing	Should companies focus on utilizing the existing structures OR adding new structures for integrated solutions?	Maintaining routines and effective control of traditional business lines AND adding flexible organizational structures toward integrated solutions	Implementing front-back structure (Davies et al., 2006; Galbraith, 2002; Pawar et al., 2009)
Belonging	Should companies focus on product-centric mindset and values OR move toward customer-centric mindset and values?	Keeping the engineering mindset AND adding values from customer- centric mindset	Involving employees in reorganizations (Antioco et al. 2008) HRM practices such as hiring new people and designing incentive systems (Kindström & Kowalkowski, 2014)
Learning	Should companies maintain past product-related capabilities OR create new capabilities to deliver integrated solutions?	Maintaining product capabilities AND developing new capabilities to deliver integrated solutions	Combining exploitation and exploration (Fischer et al. 2010)
Performing	Should companies focus on the short-term performance targets of product and service units OR focus on the long-term targets of integrated solutions?	Achieving the performance targets of product and service units AND creating new revenues from integrated solutions	Modularizing a limited range of products and services that can be easily bundled (Baines, Lightfoot, Peppard, et al., 2009; Davies et al., 2007; Storbacka et al., 2013).
Belonging and organizing	Should companies maintain the traditional business units' ethos OR develop collaborative structures toward integrated solutions?	Maintaining the traditional ethos AND developing collaborative structures toward integrated solutions	"New organizational interfaces" (Windahl, Andersson, Berggren, & Nehler, 2004), "project organization and integration into existing divisions or outsourcing" (Biege, Lay, & Buschak, 2012: 953).
Learning and belonging	Should companies keep the old engineering ethos OR learn new solutions capabilities?	Keeping the traditional mindsets and capabilities AND learning to integrate and deliver customer solutions	Creating boundary spanning professional identities beyond the service factory (Spring and Araujo 2013).

Performing and belonging	Should companies focus on individual performance targets of product and service units OR on creating a joint identity to achieve the performance target of the integrated solutions business line?	Coping with the separate product and service mindsets and performance targets AND contributing to the performance of the integrated solutions business line.	Implementing capture teams for solutions selling and management (Davies et al., 2006; Galbraith, 2002).
Learning and organizing	Should companies maintain product-oriented business unit structures and capabilities OR create a new organizational structure and skills to deliver integrated solutions?	Maintaining capabilities of product and service business units AND developing structures and capabilities to deliver integrated solutions	Partnering with suppliers (Windahl et al. 2004) while integrating "supply chains into the delivery process" (Baines et al., 2009: 507).  Vertically integrating and centralizing manufacturing (Baines et al., 2009).
Performing and organizing	Should companies focus on achieving short-term performance targets of traditional business units OR organize for long term performance in integrated solutions?	Maintaining the focus on performance targets in traditional business units AND reorganizing to achieve targets in integrated solutions	Routinize internal processes (Adler et al. 1999) for modularization (Davies & Brady, 2000), "customercentric profit centers" (Galbraith 2002).
Learning and performing	Should companies focus on ensuring the performance of products and services OR on building capabilities for integrated solutions?	Ensuring short-term performance in products and services AND building capabilities for long-term performance integrated solutions	Temporal, structural, and contextual ambidexterity (Raisch and Birkinshaw 2008).

SOURCE: Authors' own elaboration based on interviews.

# 4.2. Paradoxical tensions in integrated solutions

# 4.2.1. Tension between learning and organizing

Organizing and learning tensions surface in organizational capabilities that aim at focus and efficiency while also enabling change and agility. The demand for dynamic capabilities creates tensions in seeking to continuously renew and alter stable routines (Teece, Pisano, and Shuen 1997). For example, Eisenhardt and Martin (2000) argued that "for capabilities to be truly dynamic, the routines themselves must be flexible and versatile" (Smith and Lewis 2011, p. 384). As suggested by Adler et al. (1999), "the cost of output flexibility can be reduced if the associated internal processes can be made more routine." Thus, this tension reflects the need to transform operations to offer a broader scope of repeatable integrated solutions while simultaneously maintaining structures that are efficient enough to achieve economies of scale through repeatable solutions. According to Davies and Brady (2000), firms should develop repeatable solutions by utilizing experiences from prior projects. Many studies highlight modularization as a means of coping with the tensions between integrated customer solutions and structures that create stability (Carlborg and Kindström 2014; Gebauer 2011; Storbacka et al. 2013).

"That was the challenge and partly still is today because almost whatever we do, going forward will likely involve sacrificing something we do today because customers are looking for continuously decreasing operational costs. This is easier said than done, however, because it really requires quite some innovations and business development, so

you need completely different types of colleagues as well, particularly coming from that genuine technical background that we had." (AM3)

# 4.2.2. Tension between organizing and performing

Tensions "between organizing and performing can be summarized by the interplay between means and ends or process and outcome, apparent in conflicts between meeting employee and customer demands (Gittell, 2004) and between seeking high commitment and high performance" (Smith and Lewis 2011, p. 384). Adler et al. (1999, p. 44) maintain that, "efficiency requires a bureaucratic form of organization with high levels of standardization, formalization, specialization, hierarchy, and staffs; but these features of bureaucracy impede the fluid process of mutual adjustment required for flexibility; and organizations therefore confront a tradeoff between efficiency and flexibility". In the context of integrated solutions, this tension describes a situation in which companies intend to create stability through organizational structures while simultaneously increasing performance by also selling integrated solutions. The challenge of stable organizational structures is described well by one of our interviewees:

"As long as the service is not in a separate business unit, all things are made in terms of product business, and often the service will focus only on spare parts and on basic services; and the value adding services and business solutions cannot be developed when it is a sort of subset of the product unit..." (CM4)

"At certain times, services has been a separate business unit, and at some times, part of the production line...when we have been separate, the cooperation has been quite complicated and full of tension...because every unit wants to maximize its own share, and I guess we

have been considered then just as creating costs for them...I guess this is some sort of suboptimization from our side, too." (CM6)

Even if the customer solution "involves the provision of tailored combinations of products and services as high-value integrated solutions" (Davies, Brady, and Hobday 2006, p.1), these inserts clearly represent the pressures of efficiency, profitability and cost awareness in these companies (Fang, Palmatier, and Steenkamp 2008; Neely 2008; Tuli, Kohli, and Bharadwaj 2007). Accordingly, the complex and often intangible concept of customer value must be quantified into a form that has 'objectified at least some point of the procurement process' (Lindberg and Nordin 2008) to make the agreement even possible. Indeed, there is a tension between integrated, customized solutions and maintaining high-capacity utilization in factories.

"...the customers were very much diverse and we try to understand them, which means that we try to adapt. And then when we try to adapt, we have difficulties with our production because they have to adapt and there are certain difficulties because the cost and the profit is based on making standardized products. In addition, the product factory also must forecast how much is going to come, so they can also go to their supply chain and do the planning. However, they couldn't have any grip on this process because sometimes from this market-segment came, that now we need this engine type, and suddenly the other segment said, no, we don't need that one. So, the product factory was trying to kind of adjust and find a way." (AM12)

# 4.2.3. Tension between performing and belonging

"Belonging and performing tensions emerge when identification and goals clash, often apparent in efforts to negotiate unique individual identities with social or occupational demands" (Smith and Lewis 2011, p. 384). In the cases analyzed, this conflict arises between the traditional way of thinking and the identities of the product and service business units and the performance objective of selling integrated solutions. Whereas the organizations seek to enhance performance by selling integrated solutions, the individual engineering- and divisional-oriented identities prevent the profitable selling of integrated solutions.

"...it's quite clear in our strategy that services are a really important factor for this company. But the further you go down in the organization, there are many people who do not regard services as an important thing or do not understand the customer value or the internal value that you get from an ongoing business compared to the business on the CAPEX-side. Maybe they don't understand what kind of margins we are talking about when we talk about service compared to conventional CAPEX." (DM2)

"...because CAPEX is another division and OPEX is another division, and now we are trying to mix the money between divisions and this is then the mindset that is quite difficult for the people who say hey, what is he doing, he's taking money from me and putting it there, you understand? What shall I say to my boss, we [one business unit] have a negative margin and they [other business unit] have a much more positive margin?" (AM5)

"We had many different efforts and investments in service business and also strong and visionary leaders, but this was not enough because we did not have the same direction as a company...I think many of the guys here thought we are now going the wrong direction as a company when investing in these things." (CM7)

# 4.2.4. Tension between belonging and learning

Belonging and learning create tensions between the desire to retain the current identity of product-oriented individuals and the company-level need to move in the direction of integrated solutions (Shah et al. 2006). As the focal solution providers build on history as engineering-oriented product or technology companies, they may find it challenging to move toward customer-driven integrated solutions. Although the need for development is obvious for many companies, organizational and business unit identities may often become barriers to adaptation and change. The transformation from a product-oriented company to a customer-focused company is considered the ultimate challenge.

"...at the end of the 90s, by then we could say that our service organization mainly consisted of a bunch of engineers, very technically focused, which most of us were. And then, if you gradually have to transform to customer services organization and become very proactive and customer-oriented, it's not an easy task." (AM6)

"If we have been moving from products to services, the main issue is here: in cultural changes. Because we have been so product-oriented and built up our organization so product-oriented that it's a really slow change." (AM9)

This finding is aligned with prior studies that consider the cultural aspects of servitization (Bowen, Siehl, and Schneider 1989; Brax 2005; Martinez et al. 2010) because it considers that moving from an engineering mindset to a service mindset requires not only changing a way of thinking but also changing behaviors within the company. According to Gebauer and Friedli, (2005, p. 74), behavioral change relates to managers' risk aversion, belief in the economic potential of services, encouragement of employees and establishment of appropriate processes to extend the service component of the business, freeing up employees and adding service capacity to overcome the short- and long-term effects of the erosion of quality.

"It's an entirely different behavioral model in product selling and solution selling. And the challenge we have as a company is that it's very difficult to convert those who are comfortable selling from the front, that is, in a sort of solo performance, to be team leaders of a larger effort." (AM6)

Moreover, solution providers seem to find it challenging to motivate traditional product sellers to sell integrated solutions because these solutions are more complex and difficult to sell and buy and they include longer sales processes. Offering integrated solutions also challenges the existing culture and identity as well as the power positions within the organization. Thus, the existing organizational identity may create inertia, preventing the effective implementation of industrial

service strategies. Changing organizational identities and cognitive maps appears to be extremely challenging. Because the value migration toward integrated solutions requires organizational change, the situation may arise in which companies consider new recruitments as the only solution.

"... [it] is a big risk if you take a top notch engineer and you say: 'now you're going to be a sales manager for that product type'; it doesn't necessarily work. So, that's one challenge of this evolution from technical to sales, commercial. You probably should recruit some new people with these new skills that you need, but we didn't do that in the beginning." (AM6)

"... [name of the company removed] is full of technical expertise. What we really need to have are those people who understand the value of the customer but are not pure sellers. They are people who know and understand the importance of services and connection to technology. Those kinds of people you must train and coach and search for...We have strong technical training and technical expertise in Finland, but connecting technical expertise to the service business, customer value and understanding of customer needs is challenging." (EM4)

### 4.2.5. Tension between learning and performing

"Learning and performing spur tensions between building capabilities for the future while ensuring success in the present" (Smith and Lewis 2011, p. 384). This tension is aligned with the discussion regarding ambidextrous innovation strategies and simultaneous exploitation and

exploration (Raisch and Birkinshaw 2008). Implementing organizational transition toward integrated solutions requires a balance between the exploration of the new solutions business logic and the exploitation of the current product and service logic – an ambidextrous task that is highly demanding. Manufacturers find it difficult to maintain profitability in their existing businesses while changing the business logic toward integrated solutions – where customers expect customization. Solution providers find it paradoxical to transform businesses toward integrated solutions while maintaining high levels of performance in current product and service businesses.

"...this type of change in management, that's really the ultimate challenge. To really get this message through the organization and get everybody to become customer-focused, creative, and innovative rather than only technically focused. And still to be able to continuously develop that to some profitable business." (AM3)

"...one transformation within competences is to move from these sales of spare parts and individual field service jobs into these longer agreements. So, we must improve our processes there and be able to maintain our good profitability in the midst of all this change." (AM7)

### 4.2.6. Tension between belonging and organizing

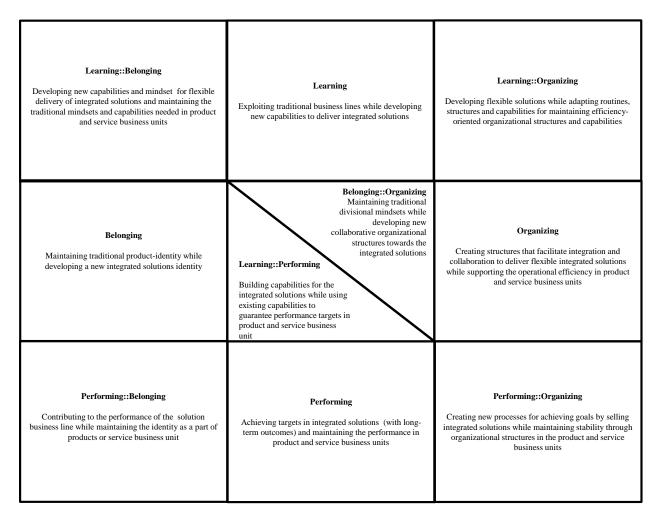
"Organizing involves collective action and the subjugation of the individual for the benefit of the whole. Yet, organizing is most successful when individuals identify with the whole and contribute their most distinctive personal strengths" (Smith and Lewis 2011, p. 384). In the cases analyzed

in this study, the tension between belonging and organizing emerge from the traditional mindset of an individual, which contrasts with developing an organizational structure that intends to coordinate individuals to work toward integrated solutions. Whereas belonging highlights the individual identity, organizing emphasizes coordination through structures, systems and procedures.

"It's also about power. Who is the decision maker? So, let's say we have a product that you sell for 10 million, but the life-cycle revenue is 80 million. Who should make the decisions on pricings when we sell the actual equipment? Is it important to get the install-base, to get the life-cycle revenue? And you can understand from earlier that the product lines were fully deciding these things. So, also with respect to this kind of power, let's say, many fights have taken place." (DM2)

"...we have this kind of traditional split that the services unit handles what happens after the asset has been taken into use and the product unit deals primarily with what's between the idea and the realization of that idea into a physical asset. It can be a burden in the sense that it creates this type of DNA that one is very strongly identified with this kind of engineering and manufacturing, and delivering something." (AM6)

Figure 2. Paradoxical practices in transition toward integrated solutions



SOURCE: Authors' own elaboration based on interviews.

### 5. Conclusion

# 5.1. Theoretical contribution

Acknowledging the tensions between product and solutions logics when transforming a manufacturing company into an integrated solution provider, the present study extends the industrial service literature by applying paradox theory to leading cases of manufacturing companies that have been muddling through the paradoxical challenges encountered in

transitioning toward integrated solutions. Although the previous industrial service literature has introduced the concept of the service paradox (Gebauer et al. 2005), paradox theory has not been systematically used to analyze the challenges that manufacturing companies face during service transformation. By acknowledging and appreciating the tensions that a manufacturer may face during the servitization processes, this study develops a framework to identify the paradoxes that companies must address when transforming into integrated solutions companies.

This study recognized four paradoxes of servitization including the paradox between a) exploiting traditional businesses while developing new capabilities to deliver integrated solutions (the paradox of learning), b) creating structures that facilitate integration and collaboration to deliver flexible integrated solutions while supporting operational efficiency in product and service business units (the paradox of organizing), c) achieving targets in integrated solutions (with long-term outcomes) while maintaining performance in product and service business units (the paradox of performing), and d) maintaining traditional product identity while developing a new integrated solutions identity (the paradox of belonging).

As "[t]ensions operate between as well as within these categories" (Smith and Lewis 2011, p. 384), they create new paradoxes. The six tensions recognized in this study include the following:

1) providing flexible delivery of solutions while creating new routines, structures and capabilities for maintaining the traditional efficiency-oriented organizational structures and capabilities (the paradox between learning and organizing), 2) creating stability through organizational structures in the product and service business units while developing new processes for achieving goals by selling integrated solutions (the paradox between organizing and performing), 3) the clash

between the need to be part of the solution business and contributing to the collective performance while remaining part of and contributing to achieving performance in the product and service business units (the paradox between performing and belonging), 4) developing new capabilities and mindsets for the flexible delivery of integrated solutions while also maintaining the traditional mindsets and capabilities required in the product and service business units (the paradox between belonging and learning), 5) maintaining traditional divisional mindsets while developing new collaborative organizational structures toward integrated solutions (the paradox between belonging and organizing), and 6) building the capabilities for integrated solutions while employing existing capabilities to guarantee the achievement of performance targets in products and services (the paradox between learning and performing).

The tension between learning and organizing was identified in the need to transform the company into an integrated solutions company when older organizational structures, processes, systems and institutional symbols continue to favor the traditional product logic in which products and services are considered separate and complementary rather than as parts of bundled and integrated solutions. Tensions between organizing and performing may emerge in situations in which performance management is steered toward integrated solutions, while the organization tends to maintain separate and distant product and service operations. Performance management systems that are steered toward integrated solutions may clash with the traditional engineering identity, which continues to focus on technology and products rather than customer value. Finally, when learning is steered toward service transformation, the traditional engineering identity has been found to generate organizational inertia against such transformation.

# 5.2. Managerial contribution

For the paradoxes and paradoxical tensions, some balancing elements were identified. It was previously noted that because paradoxes cannot be solved, organizations and managers must accept, appreciate, make sense of, and cope with the paradoxical tensions (Beech et al. 2004; Lewis 2000; Poole and van de Ven 1989). When companies may be lacking finalized strategic intentions to focus on integrated solutions, they might decide to balance the logics of product and integrated solutions. For this task, companies can establish a separate unit for integrated solutions while maintaining product and service business units. Moreover, the paradox of organizing reflected the need to create appropriate structures for delivering integrated solutions without disrupting operations in product and service business units. As a solution, this study found a separate unit for integrated solutions. Run separately, the integrated solutions unit can organize and create its own organizational culture, while product and service organizations can, to an extent, maintain their product- and service-oriented cultures. In addition, a separate integrated solutions unit might provide a good solution to the paradox of performing, i.e., the performance management system can support the sale of integrated solutions, while maintaining the high performance aspects of separate product and service business units. The paradox of belonging suggested a tension between the product mindset of an individual and the objective of an organizational culture oriented toward integrated solutions. Creating an organizational culture that cherishes the complementary purposes of different business units and leadership that aims to achieve the targets of the separate business units might provide a means of stretching the organization to meet conflicting demands. Moreover, establishing a separate integrated solutions unit may facilitate the implementation of integrated solutions strategies by reducing the

organizational inertia, solving the challenges related to management systems, and enabling the organization to cherish different individual and organizational identities in product, service and solutions units.

To balance between stability and transformation, we suggested the routinization of internal processes. For the challenges of utilizing production capacity effectively while organizing in the direction of integrated solutions, we suggested the modularization and mass customization of solutions. With respect to organizations' creation of a solution provider identity while maintaining high efficiency in product and services sales, we identified a paradox between belonging and performing. To cope with this paradox, companies might develop end-to-end business lines to better coordinate the delivery of integrated solutions. Transformation in the direction of integrated solutions creates a conflict with the engineering identity of an individual and the organizational identity of a technology or product company. To cope with the tension between transformation in the direction of integrated solutions and product identity, job roles may be created that span the typical job roles in a product company or product, service, and solutions operations may be separated into separate companies to continue to develop and maintain multiple organizational identities. The paradoxes of learning and performing create a tension between exploration and exploitation. To cope with this tension, studies suggest ambidexterity in combining explorative and exploitative behaviors by separating them into different functional units, stretching resources to meet both demands, or separating the tasks according to time or space. Finally, the paradoxes of belonging and organizing create a tension between an individual's engineering or product identity and organizational structures that are geared toward integrated solutions. To strike a balance between product mindset and

organizational structures, organizations can employ service blueprinting to explicate the advantages of integrated solutions, which would motivate the organizations to understand the complementary value of products, services and integrated solutions.

# 5.3. Limitations and suggestion for future research

The present study has limitations that should be considered. First, the list of identified paradoxes is not intended to be exhaustive. Instead, it represents those paradoxes that are recognized in the case companies analyzed in this study. Second, because of the complexity of paradox theory, paradoxical tensions might present some overlap in terms of drivers and initiatives for coping with those tensions. Third, this article focuses on the internal tensions faced by the organizations analyzed hereunder but does not analyze the tensions and paradoxes created by the external environment and its multiple stakeholders. Consequently, the framework developed in this study is not intended to provide ultimate (only possible) empirical results regarding the paradoxical challenges faced by the studied cases. Instead, the approach utilized and developed herein intends to facilitate recognition of the paradoxical tensions faced by manufacturing companies when they move from products and add-on services toward integrated solutions. Thus, the framework provides the potential for future research that focuses on the paradoxes that manufacturing companies face, alongside managerial tools to find solutions for those paradoxes. Although the list of paradoxes is not complete, we believe that our results provide important guidelines to extend the industrial service literature by using the service paradox approach. Studies involving other cases may provide additional paradoxical challenges; hence, further case studies should be considered.

- Adler, Paul S. (2001), "Market, Hierarchy, and Trust: The Knowledge Economy and the Future of Capitalism," *Organization Science* 12(2),215–34.
- Allmendinger, Glen, and Ralph Lombreglia (2005), "Four Strategies for the Age of Smart Services," *Harvard Business Review* (October),131–45.
- Anderson, James C., and James A. Narus (1995), "Capturing the Value of Supplementary Services," *Harvard Business Review* (January-February),75–83.
- Andriopoulos, Constantine, and Marianne Lewis (2010), "Managing Innovation Paradoxes: Ambidexterity Lessons from Leading Product Design Dompanies," *Long Range Planning* 43(1),104–22.
- Antioco, Michael, Rudy K. Moenaert, Adam Lindgreen, and Martin G. M. Wetzels (2008), "Organizational Antecedents to and Consequences of Service Business Orientations in Manufacturing Companies," *Journal of the Academy of Marketing Science* 36(3),337–58.
- Auguste, Byron G., Eric P. Harmon, and Vivek Pandit (2006), "The Right Service Strategies for Product Companies," *The McKinsey Quarterly* (1),40–51.
- Baines, Tim S., Howard W. Lightfoot, Joe Peppard, et al. (2009), "Towards an Operations Strategy for Product-Centric Servitization," *International Journal of Operations & Production Management* 29(5),494–519.
- Baines, Tim S., and Howard W. Lightfoot (2014), "Servitization of the Manufacturing Firm: Exploring the Operations Practices and Technologies That Deliver Advanced Services," *International Journal of Operations & Production Management* 34(1),2–35.
- Baines, Tim S., Howard W. Lightfoot, Ornella Benedettini, and J. M. Kay (2009), "The Servitization of Manufacturing: A Review of Literature and Reflection on Future Challenges," *Journal of Manufacturing Technology Management* 20(5),547–67.
- Beech, Nic et al. (2004), "Paradox as Invitation to Act in Problematic Change Situations," *Human Relations* 57(10),1313–32.
- Beverland, Michael, and Adam Lindgreen (2010), "What Makes a Good Case Study? A Positivist Review of Qualitative Case Research Published in Industrial Marketing Management, 1971–2006," *Industrial Marketing Management* 39(1),56–63.

- Biege, S., G. Lay, and D. Buschak (2012), "Mapping Service Processes in Manufacturing Companies: Industrial Service Blueprinting," *International Journal of Operations & Production Management* 32(8),932–57.
- Bowen, David E., Caren Siehl, and Benjamin Schneider (1989), "A Framework for Analyzing Customer Service Orientations in Manufacturing," *Academy of Management Review* 14,75–95.
- Brady, Tim, Andrew Davies, and David M. Gann (2005), "Creating Value by Delivering Integrated Solutions," *International Journal of Project Management* 23(5),360–65.
- Brax, Saara A. (2005), "A Manufacturer Becoming Service Provider Challenges and a Paradox," *Managing Service Quality* 15(2),142–55.
- Calton, J. M., and S. L. Payne (2003), "Coping with Paradox: Multistakeholder Learning Dialogue as a Pluralist Sensemaking Process for Addressing Messy Problems," *Business Society* 42(7),7–42.
- Carlborg, Per, and Daniel Kindström (2014), "Service Process Modularization and Modular Strategies," *Journal of Business & Industrial Marketing* 29(4),313–23.
- Cohen, Morris A., Narendra Agrawal, and Vipu Agrawal (2006), "Winning in the Aftermarket," *Harvard business review* 84(may),129–38.
- Cohen, Wesley M., and Daniel A. Levinthal (1990), "Absorptive Capacity: A New Perspective on Learning and Innovation," eds. William H Starbuck and Peter S Whalen. *Administrative Science Quarterly* 35(1),128–52.
- Davies, Andrew (2004), "Moving Base into High-Value Integrated Solutions: A Value Stream Approach," *Industrial and Corporate Change* 13(5),727–56.
- Davies, Andrew, and Tim Brady (2000), "Organisational Capabilities and Learning in Complex Product Systems: Towards Repeatable Solutions," *Research Policy* 29(7-8),931–53.
- Davies, Andrew, Tim Brady, and Michael Hobday (2006), "Charting a Path toward Integrated Solutions," *MIT Sloan Management Review* 47(3),39–48.
- ——. (2007), "Organizing for Solutions: Systems Seller vs Systems Integrator," *Industrial Marketing Management* 36(2),183–93.
- Dubois, Anna, and Luis Araujo (2007), "Case Research in Purchasing and Supply Management: Opportunities and Challenges," *Journal of Purchasing and Supply Management* 13(3),170–81.
- Dubois, Anna, and Lars-Erik Gadde (2002), "Systematic Combining: An Abductive Approach to Case Research," *Journal of Business Research* 55(7),553–60.

- Dyer, W. G., and A. L. Wilkins (1991), "Better Stories, Not Better Constructs, to Generate Better Theory: A Rejoinder to Eisenhardt," *Academy of Management Review* 16(3),613–19.
- Eisenhardt, K. M., and J. Martin (2000), "Dynamic Capabilities: What Are They?," *Strategic Management Journal* 21((Special Issue 10/11)),1105–21.
- Eisenhardt, Kathleen M. (1989), "Building Theories from Case Study Research," *The Academy of Management Review* 14(4),532.
- Eisenhardt, Kathleen M., and M. E. Graebner (2007), "Theory Building from Cases: Opportunities and Challenges," *Academy of Management Journal* 50(1),25–32.
- Eisenstat, Russell, Nathaniel Foote, Jay R. Galbraith, and Danny Miller (2001), "Beyond the Business Unit," *The McKinsey Quarterly* 1,54–63.
- Fang, Eric, Robert W. Palmatier, and Jan-benedict E. M. Steenkamp (2008), "Effect of Service Transition," *Journal of Marketing* 72(September),1–14.
- Finne, Max, Saara A. Brax, and Jan Holmström (2013), "Reversed servitization paths: A case analysis of two manufacturers," *Service Business* 7,513–37.
- Fischer, Thomas et al. (2010), "Exploitation or Exploration in Service Business Development?: Insights from a Dynamic Capabilities Perspective," *Journal of Service Management* 21(5),591–624.
- Galbraith, Jay R. (2002), "Organizing to Deliver Solutions," *Organizational Dynamics* 31(2),194–207.
- Gebauer, Heiko (2011), "Exploring the Contribution of Management Innovation to the Evolution of Dynamic Capabilities," *Industrial Marketing Management* 40(8),1238–50.
- Gebauer, Heiko, B. Edvardsson, A. Gustafsson, and Lars Witell (2010), "Match or Mismatch: Strategy-Structure Configurations in the Service Business of Manufacturing Companies," *Journal of Service Research* 13(2),198–215.
- Gebauer, Heiko, Thomas Fischer, and Elgar Fleisch (2010), "Exploring the Interrelationship among Patterns of Service Strategy Changes and Organizational Design Elements," *Journal of Service Management* 21(1),103–29.
- Gebauer, Heiko, and Elgar Fleisch (2007), "An Investigation of the Relationship between Behavioral Processes, Motivation, Investments in the Service Business and Service Revenue," *Industrial Marketing Management* 36(3),337–48.
- Gebauer, Heiko, Elgar Fleisch, and Thomas Friedli (2005), "Overcoming the Service Paradox in Manufacturing Companies," *European Management Journal* 23(1),14–26.

- Gebauer, Heiko, and Thomas Friedli (2005), "Behavioral Implications of the Transition Process from Products to Services," *Journal of Business & Industrial Marketing* 20(2),70–78.
- Gibbert, Michael, Winfried Ruigrok, and Barbara Wicki (2008), "Research Notes and Commentaries What Passes as a Rigorous Case Study?," *Strategic Management Journal* 29(July 2005),1465–74.
- Golden-Biddle, K., and H. Rao (1997), "Breaches in the Boardroom: Organizational Identity and Conflicts of Commitment in a Nonprofit Organization," *Organization Science* 8(6),593–612.
- Gremyr, Ida, Nina Löfberg, and Lars Witell (2010), "Service Innovations in Manufacturing Firms," *Managing Service Quality* 20(2),161–75.
- Huberman, M., and M. Miles (1994), "Data Management and Analysis Methods," In *Handbook of Qualitative Research*, eds. N. Denzin and Y. Lincoln. London: Thousand Oaks, 428–44.
- Hull, Frank M. (2004), "Innovation Strategy and the Impact of a Composite Model of Service Product Development on Performance," *Journal of Service Research* 7(2),167–80.
- Jacob, Frank, and Wolfgang Ulaga (2008), "The Transition from Product to Service in Business Markets: An Agenda for Academic Inquiry," *Industrial Marketing Management* 37(3),247–53.
- Jarzabkowski, P., and J. Sillince (2007), "A Rhetoric-in-Context Approach to Building Commitment to Multiple Strategic Goals," *Organization Studies* 28(11),1639–65.
- Jay, Jason (2013), "Navigating Paradox as a Mechanism of Change and Innovation in Hybrid Organizations," *Academy of Management Journal* 56(1),137–59.
- Johnstone, Stewart, Andrew Dainty, and Adrian Wilkinson (2009), "Integrating Products and Services through Life: An Aerospace Experience," *International Journal of Operations & Production Management* 29(5),520–38.
- Karpen, Ingo O., Liliana L. Bove, and Bryan A. Lukas (2012), "Linking Service-Dominant Logic and Strategic Business Practice: A Conceptual Model of a Service-Dominant Orientation," *Journal of Service Research* 15(1),21–38.
- Kindström, D., C. Kowalkowski, and E. Sandberg (2013), "Enabling Service Innovation: A Dynamic Capabilities Approach," *Journal of Business Research* 66(8),1063–73.
- Kindström, Daniel, and Christian Kowalkowski (2009), "Development of Industrial Service Offerings: A Process Framework," *Journal of Service Management* 20(2),156–72.
- ——. (2014), "Service Innovation in Product-Centric Firms: A Multidimensional Business Model Perspective," *Journal of Business & Industrial Marketing* 29(2),96–111.

- Kowalkowski, Christian et al. (2012), "Service Infusion as Agile Incrementalism in Action," *Journal of Business Research* 65(6),765–72.
- Kowalkowski, Christian, Daniel Kindström, and Per-Olof Brehmer (2011), "Managing Industrial Service Offerings in Global Business Markets," *Journal of Business & Industrial Marketing* 26(3),181–92.
- Leonard-Barton, Dorothy (1990), "A Dual Methodology for Case Studies: Synergistic Use of a Longitudinal Single Site with Replicated Multiple Sites," *Organization Science* 1(3),248–66.
- Lewin, A.Y., S. Massini, and C. Peeters (2010), "Microfoundations of Internal and External Absorptive Capacity Routines," *Organization Science* 22(1),81–98.
- Lewis, Marianne W. (2000), "Exploring Paradox: Toward a More Comprehensive Guide," *Academy of Management Review* 25(4),760–76.
- Lightfoot, Howard W., Tim S. Baines, and Palie Smart (2013), "The Servitization of Manufacturing: A Systematic Literature Review of Interdependent Trends," *International Journal of Operations & Production Management* 33(11),1408–34.
- Lindberg, N., and F. Nordin (2008), "From Products to Services and Back Again: Towards a New Service Procurement Logic," *Industrial Marketing Management* 37(3),292–300.
- Lüscher, L. S., and M. W. Lewis (2008), "Organizational Change and Managerial Sensemaking: Working through Paradox," *Academy of Management Journal* 51(2),221–40.
- Martinez, Veronica, Marko Bastl, J. Kingston, and Stephen Evans (2010), "Challenges in Transforming Manufacturing Organisations into Product-Service Providers," *Journal of Manufacturing Technology Management* 21(4),449–69.
- Mathieu, Valérie (2001), "Service Strategies within the Manufacturing Sector: Benefits, Costs and Partnership," *International Journal of Service Industry Management* 12(5),451–75.
- Matthyssens, Paul, and Koen Vandenbempt (2008), "Moving from Basic Offerings to Value-Added Solutions: Strategies, Barriers and Alignment," *Industrial Marketing Management* 37(3),316–28.
- ———. (2010), "Service Addition as Business Market Strategy: Identification of Transition Trajectories," *Journal of Service Management* 21(5),693–714.
- Miller, Danny et al. (2002), "The Problem of Solutions: Balancing Clients and Capabilities," *Business Horizons* 45,3–12.
- Neely, Andy (2008), "Exploring the Financial Consequences of the Servitization of Manufacturing," *Operations and Management Research* 1(2),103–18.

- Neu, Wayne A., and Stephen W. Brown (2005), "Forming Successful Business-to-Business Services in Goods-Dominant Firms," *Journal of Service Research* 8(1),3–17.
- ——. (2008), "Manufacturers Forming Successful Complex Business Services," *International Journal of Service Industry Management* 19(2),232–51.
- O'Reilly, Charles A., and Michael L. Tushman (2011), "Organizational Ambidexterity in Action: How Managers Explore and Exploit," *California Management Review* 53(4),5–22.
- Oliva, Rogelio, Heiko Gebauer, and Jeremy M. Branm (2012), "Separate of Integrate? Assessing the Impact of Separation between Product and Service Business on Service Performance in Product Manufacturing Firms," *Journal of Business-to-Business Marketing* 19(4),309–34.
- Oliva, Rogelio, and Robert Kallenberg (2003), "Managing the Transition from Products to Services," *International Journal of Service Industry Management* 14(2),160–72.
- Ordanini, Andrea, and A. Parasuraman (2011), "Service Innovation Viewed through a Service-Dominant Logic Lens: A Conceptual Framework and Empirical Analysis," *Journal of Service Research* 14(1),3–23.
- Ostrom, Amy L. et al. (2010), "Moving Forward and Making a Difference: Research Priorities for the Science of Service," *Journal of Service Research* 13(1),4–36.
- Paiola, Marco, Nicola Saccani, Marco Perona, and Heiko Gebauer (2013), "Moving from Products to Solutions: Strategic Approaches for Developing Capabilities," *European Management Journal* 31(4),390–409.
- Patton, Michael Q. (2002), *Qualitative Research and Evaluation Methods*. Third Edit. Thousand Oaks, CA: Sage.
- Pawar, Kulwant S., Ahmad Beltagui, and Johann C.K.H. Riedel (2009), "The PSO Triangle: Designing Product, Service and Organisation to Create Value," *International Journal of Operations & Production Management* 29(5),468–93.
- Poole, Marshall Scott, and Andrew H. van de Ven (1989), "Using Paradox to Build Management and Prganization Theories," *The Academy of Management Review* 14(4),562.
- Powell, W. (1990), "Neither Market nor Hierarchy: Network Forms of Organizations," *Research in Organizational Behavior* 12(3),295–336.
- Quinn, James Brian, Thomas L. Doorley, and Penny C. Paquette (1990), "Beyond Products: Services-Based Strategy," *Harvard Business Review* 68(2),58–67.
- Raddats, C., and J. Burton (2011), "Strategy and Structure Configurations for Services within Product-Centric Businesses," *Journal of Service Management* 22(4),522–39.

- Raisch, S., and J. Birkinshaw (2008), "Organizational Ambidexterity: Antecedents, Outcomes, and Moderators," *Journal of Management* 34(3),375–409.
- Roberts, Nancy C. (2002), "Keeping Public Officials Accountable through Dialogue: Resolving the Accountability Paradox," *Public Administration Review* 62(6),658–69.
- Rothenberg, Sandra (2007), "Sustainability Through Sustainability Through Servicizing," *MIT Sloan Management Review* 48(2),82–91.
- Sawhney, M. (2006), "Going Beyond the Product: Defining, Designing and Delivering Customer Solutions," In *The Service Dominant Logic of Marketing Dialogue Debate and Directions*, eds. S.L. Vargo and R.F. Lusch. M.E. Sharpe, 365–80.
- Shah, Denish et al. (2006), "The Path to Customer Centricity," *Journal of Service Research* 9(2),113–24.
- Siggelkow, N. (2007), "Persuasion with Case Studies," *Academy of Management Journal* 50(1),20–24.
- Smith, Wendy K., Andy Binns, and Michael L. Tushman (2010), "Complex Business Models: Managing Strategic Paradoxes Simultaneously," *Long Range Planning* 43(2-3),448–61.
- Smith, Wendy K., and Marianne W. Lewis (2011), "Toward a Theory of Paradox: A Dynamic Equilibrium Model of Organzining," *Academy of Management Review* 36(2),381–403.
- Spring, Martin, and Luis Araujo (2013), "Beyond the Service Factory: Service Innovation in Manufacturing Supply Networks," *Industrial Marketing Management* 42(1),59–70.
- Statler, M., L. Heracleous, and C. D. Jacobs (2011), "Serious Play as a Practice of Paradox," *The Journal of Applied Behavioral Science* 47(2),236–56.
- Storbacka, Kaj, Charlotta Windahl, Suvi Nenonen, and Anna Salonen (2013), "Solution Business Models: Transformation along Four Continua," *Industrial Marketing Management* 42(5),705–16.
- Teece, David J., Gary Pisano, and Amy Shuen (1997), "Dynamic Capabilities and Strategic Management," *Strategic Management Journal* 18(7),509–33.
- Tuli, K. R., A. K. Kohli, and Sundar G. Bharadwaj (2007), "Rethinking Customer Solutions: From Product Bundles to Relational Processes," *Journal of Marketing* 71(3),1–17.
- Turunen, T. T., and M. Toivonen. (2011), "Organizing Customer-Oriented Service Business in Manufacturing," *Operations Management Research* 4(1-2),74–84.
- Töytäri, P. et al. (2011), "Bridging the Theory to Application Gap in Value-Based Selling," *Journal of Business & Industrial Marketing* 26(7),493–502.

- Windahl, Charlotta, Pierre Andersson, Christian Berggren, and Camila Nehler (2004), "Manufacturing Firms and Integrated Solutions: Characteristics and Implications," *European Journal of Innovation Management* 7(3),218–28.
- Windahl, Charlotta, and Nicolette Lakemond (2006), "Developing Integrated Solutions: The Importance of Relationships within the Network," *Industrial Marketing Management* 35(7),806–18.
- Visnjic, Ivanka, Bart Van Looy, and Andy Neely (2013), "Steering Manufacturing Firms Towards Service Business Model Innovation," *California Management Review* 56(1),100–123.
- Yin, Robert K. (1994), Case Study Research: Design and Methods. (2nd ed.). Newbury Park, CA: Sage.