Cultural change in servitization

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Faculty of Business, Economics and Social Sciences
University of Hohenheim

Institute of Marketing and Management

Submitted by
Benjamin Biesinger (M.Sc.)

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Dekan: Prof. Dr. Jörg Schiller

1. Prüfer: Prof. Dr. Karsten Hadwich
2. Prüfer: Prof. Dr. Markus Voeth
Prüfungsvorsitz: Prof. Dr. Christian Ernst

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1. Introduction

1.1 Background and relevance of cultural change in servitization

Manufacturers are transforming into industrial service providers. Driven by the pressure of product commoditization and competition from low-cost economies, they must innovate beyond technological superiority and scale (Neely, 2008). Competitiveness now depends on the capability to transcend past success formulas and adapt to rapid technology cycles and complex customer needs (Gebauer et al., 2020; Kowalkowski et al., 2022). Manufacturers increasingly compete on value delivered to customers rather than cost, shifting from offering products to integrated solutions with advanced services (Gomes et al., 2021). Both industrial and academic attention to servitization builds on the premise of enhancing growth and profitability by shifting "from product-focused processes, capabilities and culture to one that emphasizes services" (Brax et al., 2021, p. 518).

Creating a culture that supports service-driven transformation is critical to servitization (Biesinger et al., 2024; Martinez et al., 2010). Since products and services operate on a fundamentally different logic, servitization requires changes in organizational values, beliefs and behaviors (Vargo & Lusch, 2004, 2008). The legacy of product success instills values of efficiency and economies of scale that shape decisions and operations throughout the organization (Bowen et al., 1989; Hartwig et al., 2021). Human-centered and flexible approaches to service innovation often clash with product cultures, creating resistance and inhibiting servitization success (Mathieu, 2001). The rise of product-service-software systems intensifies these challenges as manufacturers merge product, service and digital cultures "to create solution providers in the age of digitalization" (Kohtamäki et al., 2019, p. 385). Thus, manufacturers must cultivate new ways of responding to changing operational demands when developing a service business (Burton et al., 2017).

Cultural change in servitization is widely recognized but poorly understood. Both academic and practitioner literature highlight change management as the critical success factor, yet a significant challenge (Kowalkowski & Ulaga, 2017; West et al., 2022; Zhang & Banerji, 2017). However, the prevailing conceptual ambiguity and limited knowledge diffusion in servitization research (Kohtamäki et al., 2019; Rabetino et al., 2018; Yan et al., 2021) make it difficult to define and manage the servitization culture phenomenon (Nuutinen & Lappalainen, 2012). Although literature increasingly reveals the content or

"what" of cultural change (Brax et al., 2021), such as service- and customer-oriented values, insights into the "how" of the change process remain limited (Kohtamäki et al., 2019; Lenka et al., 2018a). This research suggests that applying an integrated view on the content, process and context of change (Pettigrew, 2012), combined with an industrial psychological perspective (Ostroff et al., 2012), can advance insights that support academics and practitioners addressing cultural change. Considering these findings, this dissertation examines *how manufacturers change their organizational culture as they transform into industrial service providers and the practices that facilitate the change process.*

This section explains the phenomenon of cultural change in servitization. Section 1.2 identifies the industrial and academic challenges. Section 1.3 presents the aims of the dissertation and the contribution to the academic challenges. Section 1.4 concludes with the structure of the dissertation.

1.2 Challenges of cultural change in servitization

1.2.1 Industry challenges

The service economy is growing rapidly. Baines et al. (2024) show that services accounted for two-thirds of global gross domestic product and nearly one-quarter of international trade by 2020, with the latter projected to increase by 50% until 2040. Given this growth, competing solely based on manufacturing will disadvantage companies. Industrial services can improve financial performance, competitive differentiation and customer proximity (Schmenner, 2009). For example, life cycle solutions for the installed base can create recurring revenue streams and strengthen customer relationships (Neely, 2008; Vendrell-Herrero et al., 2022). More recently, servitization has emerged as a transformative means for manufacturers to drive sustainability and resilience to disruptive events such as the COVID-19 pandemic (Rapaccini et al., 2020; Zhang et al., 2022).

Already, 38% of manufacturers worldwide are adding services to their offering (Mastrogiacomo et al., 2019). Yet, this popularity does not imply that every manufacturer benefits from servitization. On the contrary, servitization carries high failure rates, with some manufacturers even deservitizing (Valtakoski, 2017). The clash between product and service cultures often results in performance declines instead of the anticipated financial gains (Brax et al., 2021; Kowalkowski et al., 2017). Even after overcoming financially risky phases through change management, manufacturers are still likely to encounter persistent cultural tensions (Johnstone et al., 2014). Accordingly, Davies et al. (2006,

p. 47) affirm that "changing the mindsets of thousands of employees who have grown up with a narrow vision of products or services is perhaps the biggest barrier of all."

Executives from iconic examples of successful servitization, such as IBM and ABB, confirm that the critical challenge is neither technological nor strategic but cultural (Gerstner, 2009; Kowalkowski & Ulaga, 2017). As a result, managers are constantly seeking guidance on what change in servitization entails and how to implement it (Baines et al., 2017). Building on Trice & Beyer (1993), managers must thoroughly understand the factors likely to generate resistance and their organizations' levers in a given context. Challenges arise from limited knowledge of aligning servitization values, strategies and structures (Yan et al., 2020, 2021), the role of organizational members (Biesinger et al., 2024; Lenka et al., 2018b) and integrating knowledge to drive change (Ayala et al., 2017; Valtakoski, 2017). Additionally, change theory often challenges engineering managers as they typically lack a background in organizational theory and practice (Wagstaff et al., 2021).

1.2.2 Academic challenges

Servitization has emerged as a most active area of service research (Kowalkowski et al., 2022). Although cultural change has been central since the field's inception (Bowen et al., 1989; Mathieu, 2001), the literature highlights the need for a deeper understanding of its role in servitization (Favoretto et al., 2022; Khanra et al., 2021; Zhang & Banerji, 2017). Consequently, notable academic challenges remain.

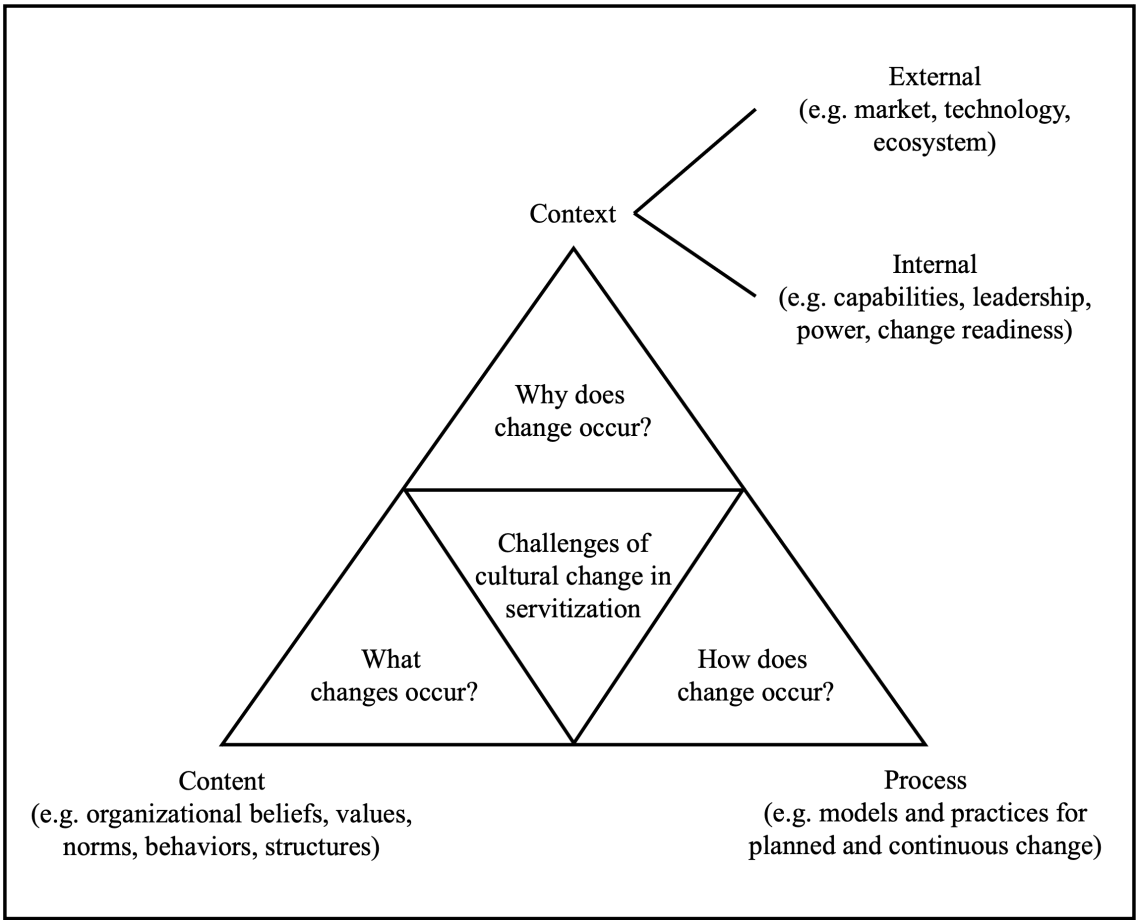
1.2.2.1 Developing a framework to study challenges of cultural change in servitization

This section presents a framework to map academic challenges of cultural change in servitization literature. Change frameworks often focus on specific theories, concepts and levels of analysis (Ostroff et al., 2012), overlooking comprehensive explorations of key organizational and human variables (Self et al., 2007). Building on Pettigrew (1987, 2012), the framework in Figure 1 provides an integrative lens to examine change through the interplay of three broad dimensions: content, process and context.

"Content" refers to the specific area or the "what" of change (Pettigrew, 1987, 2012). This dimension typically encompasses performance-related organizational factors such as structure, technology or human resource management (Self et al., 2007). Given this dissertation's focus on the servitization of manufacturing, content concerns change in a

manufacturing organization's shared beliefs, values and behaviors that guide external adaptation and internal integration as it shifts to service-based competition (Schein & Schein, 2017). Several studies operationalize the content of servitization culture and evaluate their impact on servitization outcomes, measured by performance (e.g. return on service sales) or state (e.g. advanced service implementation) (Brax et al., 2021; Fliess & Lexutt, 2019). Notable examples include the model of Gebauer et al. (2010), which links service-oriented values, behaviors and structural conditions to the performance of servitizing manufacturers, and Lexutt (2020), who identified value-strategy-structure configurations for success through basic and advanced services. Biesinger et al. (2024), featured as Article 1 of this dissertation, provide a comprehensive review of content factors.

Figure 1: Framework to study challenges of cultural change in servitization



"Process" refers to the method or the "how" of implementing change, defined as "a sequence of individual and collective events, actions, and activities unfolding over time in context" (Pettigrew, 1997, p. 338). Servitization research examines models, practices and pathways to explain what produced the difference in the change content and how to man-

age it constructively (Baines et al., 2017). Models generally differ in generative mechanisms and whether change follows a planned sequence or emerges continuously (Ostroff et al., 2012; Van De Ven & Sun, 2011). Diverging paths to servitization lead to varied approaches to modeling change (Baines et al., 2020). Cultural change in servitization is often linked to planned, radical change associated with Lewin's (1951) unfreeze-move-freeze model. Despite its explanatory value for change in industrial companies (Beverland & Lindgreen, 2007), research increasingly shows servitization to unfold through continuous responses to changing contexts, punctuated by radical events (Kowalkowski et al., 2012; Martinez et al., 2017). Notable examples include Baines et al.'s (2020) servitization progress model, which identifies stages of organizational maturity within continuous change, and Biesinger et al. (2024), who introduces organizational learning as a generative mechanism accommodating planned and continuous change in servitization.

“Context” refers to the circumstances or the “why” of change (Pettigrew, 1987, 2012), including external and internal conditions that influence organizational effectiveness. The dimension shapes the need for and interpretation of change and is, in turn, shaped by the content and process of change (Self et al., 2007). External factors drive content changes, while internal factors influence members’ beliefs and behaviors, moderating the relationship between change content and process (Mowday & Sutton, 1993; Self et al., 2007). Following Dmitrijeva et al. (2020), the external conditions in servitization are market (e.g. customer needs, economic and regulatory conditions), ecosystem (e.g. supply chain control, knowledge and collaboration networks) and technology factors (e.g. information and product technology, connectivity). Internally, servitization depends on capabilities (e.g. service, product, learning and innovation capabilities and complexity management) and maturity (leadership, culture, power and politics, operational and strategic alignment, change acceptance). As the learned way of external adaption and internal integration, culture is potentially affected by all these context factors (Schein & Schein, 2017).

Servitization literature has mainly focused on change content and its interaction with context, with fewer studies examining change processes or integrating content, process and context variables (Baines et al., 2017, 2020). This research used the content-process-context framework as an integrative lens to identify research challenges within servitization literature. Table 1 summarizes the key challenges guiding the research questions addressed in the articles of this dissertation. This list is not intended to be exhaustive, and section 5.3 discusses further challenges based on this dissertation’s findings.

Table 1: Summary of the research challenges for cultural change in servitization

Change dimensions	Challenges for research on cultural change in servitization
Content of change	• *Conceptualizing the multiple layers of servitization culture.* Clarifying the concepts and constructs defining servitization culture, including their hierarchies, relationships and roles across organizational levels. • *Synthesizing existing concepts and constructs.* Integrate disparate concepts and constructs of servitization culture into cohesive, unified frameworks. • *Extending concepts of digital and learning cultures.* Expanding the scope of servitization culture by incorporating digital and learning culture concepts to address its technology-driven and processual dimensions.
Process of change	• *Integrating organizational and sociocognitive theories.* Bridging theories to elucidate the generative mechanisms that drive cultural change in servitization across levels, including individual, group and system dynamics. • *Identifying holistic change practices.* Developing frameworks and practices that reconcile continuous with planned, episodic changes, facilitating the emergence and sustainability of servitization culture.
Context of change	• *Unfolding the roles of partnerships and servitization maturity.* Examining the mutual influence between cultural change and service-driven M&A, joint ventures and the progression of organizational servitization maturity. • *Unfolding the roles of digital technologies and ecosystems.* Examining the mutual impact between cultural change, the adoption of emerging technologies and the evolution of digital service ecosystems. • *Unfolding transformative change toward resilience and sustainability.* Examining the role of cultural change in creating service-driven resilience and sustainability in manufacturing.

1.2.2.2 Challenge 1: The content of cultural change in servitization

The literature presents various concepts that encompass the cultural change content of manufacturers transitioning to service-based competition. Academic challenges include integrating disparate concepts contributing to servitization culture, organizing their hierarchies and relationships and incorporating insights from digital and learning cultures.

The literature contributing to the discussion on servitization culture is extensive but fragmented, with scholars agreeing on foundational concepts. In line with the service-dominant logic, they emphasize the shift from a transaction-oriented product culture to one that prioritizes relationships and value co-creation (Lin et al., 2019; Salonen, 2011; Zabala et al., 2022). In quantitative and configurational research, service and customer-oriented values are key explanatory variables for both financial and non-financial outcomes (Brax et al., 2021; Lexutt, 2020). Conceptualizations are mainly grounded in market-oriented management (Deshpandé & Farley, 1998; Homburg et al., 2002; Lytle &

Timmerman, 2006) and have been further developed for the industrial servitization context (Gebauer et al., 2010, 2011; Homburg et al., 2003). However, culture spans multiple layers, including strategic enactments and structural manifestations of values (Dauber et al., 2012; Schein & Schein, 2017). Despite considerable research on the interactions of values with various organizational characteristics, no attempt has been made to integrate these findings, let alone to provide conceptual order to the concepts defining servitization culture. Additionally, many case studies contribute explicitly or implicitly to knowledge about servitization culture but are difficult to identify in bibliographic searches (Biesinger et al., 2024). Thus, servitization culture remains an umbrella term for intangible aspects, with existing models insufficient to explain, predict and manage its implications (Lienert, 2015; Lienert et al., 2019).

Against this backdrop, research must identify, integrate and extend existing knowledge of the concepts and their relationships that define servitization culture.

Digitalization and the processual view of servitization call for novel cultural concepts. Literature on digital servitization emphasizes the importance of understanding how cultural change can facilitate the technology-driven transformation of service innovation and provision (Favoretto et al., 2022). While servitization scholars are just beginning to conceptualize digital servitization cultures (Kohtamäki et al., 2019; Tronvoll et al., 2020), literature outside the field has already introduced concepts of digital-oriented values, strategic orientations and behaviors (Khin & Ho, 2018; Kindermann et al., 2021). Emerging gaps include the conceptualization of digital servitization cultures to develop capabilities for digital service innovation (Biesinger, 2024; Biesinger & Hadwich, 2023; Momeni et al., 2023), digital service infrastructure (Paschou et al., 2020; Tronvoll et al., 2020) and digital service ecosystems (Kolagar et al., 2022; Sklyar et al., 2019). Moreover, scholars increasingly view servitization as a learning process to reconfigure the organization's cognitive and behavioral basis. Drawing on the social capital theory of innovation (Lin et al., 2019) and organizational learning (Biesinger et al., 2024), they examine how learning-oriented cultures facilitate the emergence and impact of servitization cultures.

Considering these findings, research must identify concepts of digital and learning-oriented cultures and develop frameworks to integrate and contextualize them within the context of servitization.

1.2.2.3 Challenge 2: The process of cultural change in servitization

Challenges related to the process include unfolding generative mechanisms, multilevel process dynamics and practices that explain and manage cultural change in servitization.

Processual views of cultural change in servitization are still in their infancy. While scholars increasingly agree on the "what" of servitization culture, understanding the "how" of becoming a servitized organization remains limited (Kohtamäki et al., 2019; Lenka et al., 2018a; Rabetino et al., 2017). Configurational theory and research have been central in explaining how the internal environment fosters the emergence of servitization culture (Bowen et al., 1989; Bowen & Schneider, 2014) and translates it into advantageous outcomes through the complementary realignment of organizational factors with the change context (Ambroise, Prim-Allaz, & Teyssier, 2018; Brax et al., 2021; Lexutt, 2020; Yan et al., 2021). However, Gebauer et al. (2010) argue that survey-based studies provide static snapshots, which are insufficient for explaining the dynamics of the changing culture. Although qualitative case research has shed light on these dynamics as part of holistic frameworks (Salonen, 2011; Tronvoll et al., 2020), the method remains predominantly exploratory and not theory-driven (Rabetino et al., 2018). At the same time, scholars emphasize the need to incorporate social and individual cognitive theories to explain generative mechanisms that link lower-level origins and organizational outcomes (Kohtamäki et al., 2019; Rabetino et al., 2017). Multilevel theory (Lenka et al., 2018b, 2018a; Struyf et al., 2021), organizational learning (Valtakoski, 2017) and sensemaking (Kohtamäki et al., 2019) are already shifting the discourse towards a social constructivist perspective (Schein & Schein, 2017; Trice & Beyer, 1993). Following advances in industrial psychology (Ostroff et al., 2012), Biesinger et al. (2024) first integrate these perspectives to develop a comprehensive theoretical framework for cultural change in servitization.

> *In line with recent developments in the field, research should integrate organizational, social and individual psychological theories to unfold the generative mechanisms and multilevel dynamics underlying cultural change in servitization.*

The distinction between radical and continuous change is central yet ambiguous. Researchers often emphasize planned, radical change processes to drive the shift toward a servitization culture (Brax et al., 2021; Mathieu, 2001; Nuutinen & Lappalainen, 2012). However, empirical evidence increasingly supports a continuous change model, as ser-

vitization tends to emerge from manufacturers' ongoing service exploration in the aftermarket (Baines et al., 2020; Martinez et al., 2017; Spring & Araujo, 2013). This aligns with the observation that servitization unfolds over time, often without planned strategies and precise starting or ending points (Kohtamäki et al., 2021; Kowalkowski et al., 2012). Accordingly, planned-change models like Lewin's force field analysis have proven insufficient to explain servitization change processes (Wagstaff et al., 2021). As continuous change can be punctuated by radical events such as external crises or major restructuring, servitization requires practices supporting both models of cultural change processes (Baines et al., 2020; Biesinger et al., 2024; Rapaccini et al., 2020).

Given the need to address continuous change without neglecting planned, radical phases, research should integrate and develop change theories to better explain continuous cultural change and practices that support continuous and radical change.

1.2.2.4 Challenge 3: The context of cultural change in servitization

Contextual challenges include understanding the relationship between change and external growth, digital service technologies, industrial resilience and sustainability.

The context of servitization is a mature topic but lacks nuance regarding cultural change. Multiple conceptual, qualitative and quantitative studies enhance understanding of the internal and external circumstances influencing change in servitization (Ambroise, Prim-Allaz, Teyssier, et al., 2018; Baines et al., 2017, 2020; Dmitrijeva et al., 2020). Following Dmitrijeva et al. (2020), servitization is shaped by market, ecosystem and technology factors and internally by capabilities and organizational maturity. Research across markets and industries provides generalizations about how servitizing manufacturers adapt externally through their changing content of servitization culture (Brax et al., 2021; Lexutt, 2020). Less attention has been paid to how content, process and internal context factors interact to move from lower to higher servitization maturity, with service-oriented management and extensive service portfolios prioritizing customer processes over product support (Brax et al., 2021; Mathieu, 2001). In this vein, strategic partnerships and mergers and acquisitions (M&A) have gained traction as factors that drive servitization maturity, yet the literature has paid limited attention to the change management they entail (Öberg, 2023; Salonen & Jaakkola, 2015; Xing et al., 2017). While digital servitization literature increasingly shifts the discourse to emerging technology and ecosystem factors, the literature would benefit from a deeper understanding of the mutual impact of cultural

change in their development and adoption (Kohtamäki et al., 2021; Tronvoll et al., 2020). Simultaneously, external pressures from economic and ecological uncertainty have increasingly driven manufacturers to align service-driven change efforts with the creation of resilience and sustainability (Li et al., 2022; Menon et al., 2024; Rapaccini et al., 2020).

Given this backdrop, research should examine how change interacts with servitization maturity and external growth, such as service-driven M&A, while exploring its role in fostering resilience and sustainability in response to uncertain external environments.

1.3 Aims of the dissertation

This dissertation aims to address the identified academic challenges and support practitioners in managing cultural change in servitization. As shown in Table 2, three articles apply the framework to examine content, process and context challenges. A discussion of the contributions to each dimension follows.

First, this dissertation addresses the fragmented research on the content of servitization culture through Articles 1 and 2 by integrating disparate knowledge and enriching it with theories and insights from culture, organizational learning and strategic management. They develop comprehensive frameworks defining cultural concepts, constructs and variable relationships across multiple levels that drive servitization performance. Both articles go beyond established concepts such as service and customer orientation to conceptualize cultural dimensions of digitalization and a processual view of servitization, including digital and learning orientations relevant to digital service innovation, infrastructures and ecosystems (Biesinger & Hadwich, 2023; Kolagar et al., 2022; Tronvoll et al., 2020). Article 3 extends these frameworks with empirical findings on the cultural shifts in a manufacturer's organizational values, strategies and structures to compete through third-party industrial services. Extending the conceptualizations of Articles 1 and 2, the case study refines service and customer orientation within the third-party context. It introduces entrepreneurial learning orientation as the cultural capacity to challenge product orientation and proactively shape the market as a service-driven learning organization.

Second, this dissertation conceptualizes and examines the process of cultural change in servitization. Addressing the challenge of understanding servitization from a social constructivist perspective (Kohtamäki et al., 2019), Article 1 integrates multilevel theory,

Table 2: Aims and contributions of the dissertation

Articles				Contributions		
Title	Research questions	Theory	Method	Challenge 1: Content of change	Challenge 2: Process of change	Challenge 3: Context of change
Cultural change in servitization – a conceptual review and framework	• How can the literature on cultural change in servitization be structured and synthesized from a social constructivist perspective? • How can this synthesis be integrated into a coherent framework to serve as a theoretical baseline for developing the field of servitization?	Multilevel theory, organizational learning, sensemaking	Conceptual framework development, framework-guided systematic literature review	• Three major cultural orientations toward service, digital and learning, in values, strategies, structures, mental models and interventions that are proposed to govern successful servitization	• Conceptualization of generative mechanisms and multilevel process dynamics in cultural change through integrating organizational learning and sensemaking • Practices to remove belief, information and behavioral barriers to servitization during continuous and planned, radical change processes	• Cultural change towards two maturity stages of servitization – customer support-driven servitization and excellence-driven servitization (cf. Brax et al., 2021) • Digital service technologies, ecosystems and connectivity
The role of strategic and learning orientation in creating competitive advantage through digital service innovation	• What are the cultural antecedents of digital service innovation, and what antecedent conditions can create manufacturers' competitive advantage and thus foster resilience?	Organizational learning, resource-based view, dynamic capabilities	Conceptual framework development	• Strategic orientation towards digital, service, innovation and learning culture as cultural antecedents of digital service innovation	• Strong learning orientation as a dynamic capability to translate strategic digital, service and innovation orientation into exploratory learning and radical innovation processes to build the capabilities for digital service innovation	• Cultural change toward resilience in high-velocity environments, e.g. machinery and computer-based industries • Market and environmental uncertainty • Digital technologies, e.g. Internet of Things and artificial intelligence
Path towards servitization culture: unveiling organizational learning practices to support the cultural change from product manufacturing to provision of smart solutions	• How does servitization culture unfold through organizational learning processes, and how can managerial practices support those processes?	Multilevel theory, organizational learning, continuous change intervention theory	In-depth long-term case study, qualitative interviews, secondary data analysis, abductive analysis	• Three cultural shifts in values, strategies and structures from product-based competition to independent service orientation, from technology push to customer orientation and from analytical rigidity to entrepreneurial learning orientation	• Organizational learning practices to support the continuous change process of freezing the emerging ISP culture, rebalancing the global ISP culture and unfreezing the ISP learning culture • Practices to remove belief, information and behavioral barriers to servitization during long-term continuous change	• Cultural change of a leading manufacturer towards high servitization maturity, i.e. excellence-driven servitization (cf. Brax et al., 2021) • Four organizational maturity stages throughout industrial transformation between 1980 and 2022 • M&A-driven servitization, internationalization and corporate restructuring

organizational learning and sensemaking to develop a comprehensive cultural change model for guiding future empirical research. The framework introduces an integrative perspective on the sociocognitive processes, explaining the emergence and interaction of organizational and member-level cultural factors. Based on the subsequent framework-guided literature review, the article further reveals managerial practices to support the bottom-up emergence of a servitization culture. Article 2 conceptualizes the learning and innovation processes that drive digital service innovation. Building on the organizational learning perspective central to this dissertation, it proposes cultural configurations that transcend incremental innovation processes through explorative learning to achieve radical digital service innovation. Based on the framework developed in Article 1, Article 3 examines the organizational learning practices that supported a global manufacturer's continuous change process to become a world-leading independent service provider (ISP). Following continuous change intervention theory, the article unveils managerial practices to freeze the emerging ISP culture, rebalance the global ISP culture and unfreeze the ISP learning culture (Weick & Quinn, 1999).

Third, this dissertation investigates the context of servitizing manufacturers, especially in the machine-based sector. In contrast to prior research, it explicitly refers to cultural change within established stages of servitization maturity. Based on a comprehensive literature review, Article 1 addresses the content and process of changing manufacturing culture towards successive maturity stages: from customer support-driven (limited service portfolio, low service turnover) to excellence-driven servitization (extensive service portfolio, high service turnover), while overcoming the financially risky transition stage of tactically-driven servitization (Brax et al., 2021). Article 3 adds empirical insights from the excellence-driven servitization of a mechanical engineering company into a world-leading independent rotating equipment service provider. The long-term case study spans over 35 years, detailing the manufacturer's external adaptation to the disruption of the industrial service market and internal integration of changes in culture, leadership and strategy-operations alignment (Dmitrijeva et al., 2020; Schein & Schein, 2017). Moreover, the study explicitly addresses change management to reconfigure the organization through service-driven M&A, internationalization and corporate restructuring (Xing et al., 2017). Article 2 conceptually examines the cultural change for digital service innova-

tion in machinery and computer-based industries, embracing technological and ecosystem shifts to create competitive advantage (Opazo-Basáez et al., 2022) and thus resilience in volatile environments (Teixeira & Werther, 2013).

1.4 Structure of the dissertation

This dissertation comprises five sections, including the three articles contributing to the research aims defined in section 1.3. Although the articles differ in their underlying theories, methods and emphasis, they share the aim to resolve the academic challenges of cultural change in servitization.

Following the introduction, section 2, "Cultural change in servitization – a conceptual review and framework," concerns the content and process of social construction as servitizing manufacturers change their culture. The conceptual review follows a two-step methodology to establish a theoretical baseline for cultural change research in servitization. First, the article integrates organizational and sociopsychological theories to develop an organizational learning framework for cultural change, explaining the emergence and interaction of organizational and member-level concepts (Ostroff et al., 2012). Second, the framework guides a systematic literature review to integrate fragmented knowledge on cultural change in servitization and establish conceptual order. The article presents 12 propositions, revealing three major cultural orientations (service, digital and learning) and offering guidance for managing organizational and member-level change.

Section 3, "The role of strategic and learning orientation in creating competitive advantage through digital service innovation," concerns fostering organizational learning to drive digital service innovation. The conceptual article integrates recent advances in digital servitization and organizational learning (Baker et al., 2022; Rabetino et al., 2023) within the resource-based and dynamic capabilities view (Kozlenkova et al., 2014; Teece, 2007). It challenges prior assumptions in the field by conceptualizing learning orientation as a moderator of strategic digital, service and innovation orientation to drive servitization performance (Lin et al., 2019). The article presents four propositions on the cultural antecedents and conditions, offering guidance for change management to achieve competitive advantage and resilience through digital service innovation.

Section 4, "Path towards servitization culture: Unveiling the organizational learning practices to support the cultural change from product manufacturing to independent service provision," concerns a manufacturer's cultural change to become a leading independent

service provider through service-driven M&A, internationalization and corporate restructuring. The article follows Gebauer et al.'s (2010) recommendation to gather data from interviews and company documents instead of surveys to shift from a static to a more dynamic view of cultural change in servitization. The in-depth, long-term single case study identifies three cultural streams permeating values, strategies and structures during the transformation: independent service orientation, customer orientation and entrepreneurial learning orientation. The organizational learning practices to freeze the emerging ISP culture, rebalance the global ISP culture and unfreeze the ISP learning culture offer guidance for managing continuous change processes (Weick & Quinn, 1999).

Section 5 provides a concluding analysis of all articles, deriving theoretical contributions and practical implications. Finally, this section discusses this dissertation’s limitations and suggests a future research agenda.

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2. Cultural change in servitization – a conceptual review and framework

Abstract:

Purpose – (Digital) servitization, referring to service-driven strategies and their increasing implementation in manufacturing, is one of the most rapidly growing areas in industrial service research. However, the cultural change involved in successful servitization is a phenomenon that is widely observed but poorly understood. This research aims to clarify the processes of social construction as manufacturers change their organizational culture to transform into industrial service providers.

Design/methodology/approach – This research takes a systematic approach to integrate disparate literature on servitization into a cohesive framework for cultural change, which is purposefully augmented by rationale culled from organizational learning and sensemaking literature.

Findings – The organizational learning framework for cultural change in servitization introduces a dynamic perspective on servitizing organizations by explaining social processes between organizational and member-level cultural properties. It identifies three major cultural orientations toward service, digital and learning that govern successful servitization.

Originality/value – This research contributes to the servitization literature by presenting a new approach to reframe and explore cultural change processes across multiple levels, thus providing a concrete starting point for further research in this area.

Keywords: Servitization, Digital servitization, Cultural change, Organizational culture, Organizational learning, Sensemaking

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2.1 Introduction

> The true system, the real system, is our present construction of systematic thought itself, rationality itself, and if a factory is torn down but the rationality which produced it is left standing, then that rationality will simply produce another factory (...) (Pirsig, 1984, p. 88).

> (...) the solution to the problem isn't that you abandon rationality but that you expand the nature of rationality so that it's capable of coming up with a solution. (...). The trouble is that the expansion has to be made at the roots, not at the branches, and that's what makes it hard to see (Pirsig, 1984, p. 150).

The quotes from Robert M. Pirsig's heralded inquiry into values align well with two prevalent axioms in the literature on service-driven business transformation of manufacturing: First, product and service businesses are subject to fundamentally different logics and second, transitioning between these logics requires substantial changes in an organization's deep-rooted values, thinking and behaviors (Vargo and Lusch, 2004, 2008). Therefore, managing cultural change plays a critical role in manufacturers' service-driven strategies to create competitive advantage and, more recently, as a transformative means to drive social and sustainable performance (Salonen, 2011; Zhang et al., 2022). However, despite considerable research in the field of servitization, there is still insufficient insight into service-driven change processes (Baines et al., 2017, 2020), reinforcing Nuutinen and Lappalainen's (2012, p. 138) comment that "although the importance of culture in the transition is evident, it appears to be difficult on the one hand to define the service culture phenomenon and on the other hand to have an impact on it."

Industrial service culture, as described by Nuutinen and Lappalainen (2012, p.140), refers to a manufacturer's "learned way of responding to perceived changes in demands on the core task when aiming at developing service business." This learning includes developing new values around service excellence, customer experience and digital innovation (Brax et al., 2021; Tronvoll et al.,2020) to "complement the pulling force of [the] organization's vision by pushing the company to reach that vision" (Marquardt, 2002, p.76). However, while a growing but fragmented body of evidence confirms the contingency of servitization success on such organizational-level constructs (cf. literature reviews by Favoretto et al., 2022; Khanra et al., 2021; Zhang and Banerji, 2017), systemic perspectives and

insights into the micro-processes of service-driven change are still in their infancy (Kohtamäki et al.,2019; Lenka et al., 2018a; Paschou et al., 2020; Rabetino et al., 2017; Struyf et al., 2021). As a result, the existing literature fails to unpack the learning processes by which manufacturers adapt their culture in pursuit of service-driven goals.

At the same time, organizational research increasingly recognizes the need for a social constructivist perspective that incorporates the cognitive and social structures of organizational members to understand cultural change (Ostroff et al., 2012; Scott, 2014; Weick, 1995). Thus, a promising approach to studying cultural change is through organizational learning, a conceptually closely related account that refers to multilevel change processes in the values, thinking and behaviors of individuals and groups within their organization (Schein and Schein, 2017; Wiewiora et al., 2019). Yet, besides the identified need to apply a social constructivist perspective to servitization (Kohtamäki et al., 2019), no attempt has been undertaken to employ organizational learning and the underlying sensemaking process to reconcile existing empirical findings from cultural change in servitization. Therefore, this article sets out to conduct a conceptual review of studies informing cultural change in servitization in accordance with two central research questions: (1) How can the literature on cultural change in servitization be structured and synthesized from a social constructivist perspective? (2) How can this synthesis be integrated into a coherent framework to serve as a theoretical baseline for developing the field of servitization?

To this end, this research makes several contributions. First, it integrates the disparate servitization literature into a cohesive framework of cultural change that is augmented by rationale culled from organizational learning. Second, it identifies concepts and events related to three major cultural orientations, service, digital and learning, which are proposed to govern successful transformation. Third, it shows how members' sensemaking of servitization can influence cultural change processes, accounting for differences in managers' intentions versus members' perceptions and explaining why change readiness may vary across individuals and organizations. Fourth, the framework provides insight into how management can attempt cultural change by removing members' belief, information and behavioral barriers.

2.2 Theoretical foundation and framework

This section first explains the assumptions about the core concepts servitization and organizational culture that constitute the rationale of the research approach. Second, an organizational learning framework that conceptualizes cultural change in servitization is introduced.

2.2.1 Core concepts

2.2.1.1 Servitization

Servitization describes a manufacturer's "shift from product-focused processes, organizational capabilities and culture to one that emphasizes services" (Brax et al., 2021, p. 518). The transformation primarily aims to increase and maintain profits and erect market entry barriers by moving ever closer to customers and their underlying needs (Schmenner, 2009). The concept's origins, conceptual foundations and key drivers are well documented in extant research (Rabetino et al., 2018; Ulaga and Kowalkowski, 2022). Against the backdrop of the ever-increasing digitalization of industry, digital servitization is a fast-growing literature stream that explores "the transformational process (...) to a service-centered business model with the support of digital technologies (...) to improve the value for customers and increase the company's non-financial and financial performance" (Favoretto et al., 2022, p. 109). Following Baines et al. (2020), servitization unfolds through the interplay of three dimensions of organizational change which are recognized as an appropriate structure for defining the scope and context of servitization for this review.

First, the content of change refers to the change goals and the characteristics that need to be changed (Pettigrew, 1988; Pye and Pettigrew, 2005). Building on Jayashree and Hussain (2011, p. 72), this research emphasizes that "transformational changes must serve a strategic purpose." Subsequently, for the purposes of this paper, servitization is conceptualized as a cultural change process whereby a manufacturer learns to respond to perceived changes in demands of the core task when aiming at service-driven business goals (Nuutinen and Lappalainen, 2012).

Second, the context of change refers to the external and internal circumstances in which change takes place. In line with Dmitrijeva et al. (2020), an adaptive perspective is taken with the context impacting organizations by influencing managerial efforts to adapt the organization to the contextual demands. Drawing on Dmitrijeva et al. (2020), servitization

is embedded in dimensions of the market, ecosystem and technology representing manufacturers' external context. Internal context, for its part, is represented by an organization's capabilities and maturity, with the latter comprising the prevailing culture and its interrelationships with leadership, power, strategic and operational alignment and change acceptance.

Third, the process of change refers to the stages a servitizing manufacturer goes through as one set of objectives and activities transforms into another, rearranging the internal context to create a better fit with the environment (Dmitrijeva et al., 2020). Brax et al. (2021) show that servitization typically comprises three stages of organizational maturity, with two advantageous positions in terms of financial and non-financial outcomes. These advantageous positions on the lowest and highest stages, referred to as customer support-driven servitization and excellence-driven servitization, appear appropriate to specify manufacturers' service-driven business goals. Customer support-driven servitization, which is related to high sales and customer satisfaction, is considered a primary strategy that embraces basic services of low complexity (e.g. repair and maintenance). Excellence-driven servitization, for its part, increases customer loyalty, operational performance and competitive advantage and is considered an advanced strategy toward complex services (e.g. predictive maintenance and consulting) with high coverage in the overall offering. For detailed service complexity and performance measures, refer to Brax et al. (2021), Calabrese et al. (2019) and Yan et al. (2021). Moving from customer support-driven servitization to excellence-driven servitization, tactically servitization denotes the transition stage in which the organization is at the highest financial risks. The insufficient internal maturity to support the new strategy can be overcome by radical transformational efforts toward excellence-driven servitization (Brax et al., 2021). Following Baines et al. (2020), these macro-stages are assumed to be driven by emergent processes of continuous change. A model that accounts for both continuous and radical change will be derived in the following sections. Since digital servitization is concerned with increased service complexity (Raddats et al., 2022) and radical transformation efforts (Favoretto et al., 2022; Tronvoll et al., 2020), the concept is captured by excellence-driven servitization. Echoing Kohtamäki et al. (2019) to recognize the unique role of digitalization in servitization, the results on digital servitization are highlighted in the review.

2.2.1.2 Organizational culture

The concept of organizational culture originated in anthropology (Homburg and Pflesser, 2000) and is acknowledged as an important organizational design factor in highly competitive industrial markets (Homburg et al., 2003; Nuutinen and Lappalainen, 2012). Following Schein and Schein's (2017, p. 21) foundational definition, culture refers to "the accumulated shared learning of [a] group as it solves its problems of external adaptation and internal integration; which has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, feel, and behave in relation to those problems." This accumulated learning is a "system of beliefs, values, and behavioral norms that come to be taken for granted as basic assumptions and eventually drop out of awareness." The definition denotes culture as a socially constructed phenomenon influenced by organizational history and draws on two essential characteristics widely accepted across the epistemologies and definitions of the field (Ostroff et al., 2012).

First, culture includes multiple layers of organizational characteristics that vary in accessibility and subjectivity. Schein (1985) distinguishes three layers spanning (1) artifacts, which are the observable products of a group that represent surface realizations of (2) espoused goals, which in turn are manifestations of (3) underlying assumptions or values at the core of culture. This multidimensional conceptualization of culture has proven particularly relevant for analyzing the forces underpinning organizational behavior, e.g. toward market orientation (Homburg and Pflesser, 2000) and innovativeness (Hogan and Coote, 2014).

Second, shared mental models are essential to understand the social construction of culture. Organizational members process information using mental models to categorize objects and events based on important features to make sense of, predict and enact their environment (Fiske and Taylor, 2017). They represent what one thinks, the criteria influencing what is noticed versus ignored, and how one will act (Weick, 1995, 2001). Through group processes, members develop a "shared, organized understanding and mental representation of knowledge about key elements of the [collective]'s relevant environment" (Mohammed et al., 2010, p. 879), which provides the basis for organizational goals and values that guide members' interpretation and enactment of the organizational context (Weber and Glynn, 2006).

2.2.2 Conceptualizing an organizational learning framework for cultural change in servitization

2.2.2.1 Conceptual overview

Tying in with Schein and Schein's (2017) social constructivist perspective, the framework is designed to map the process of cultural change in servitization based on the events and aspects extracted from the literature review. Building on Ostroff et al. (2012), the social construction of culture implies a multilevel process that, first, is driven by the need for learning at the organizational level to achieve service-driven goals and, second, emerges and is institutionalized through sensemaking at the member level (see Table 1).

Drawing on a sensemaking perspective allows for recognizing cultural change as a continuous interplay between organizational learning and the institutionalization of emergent mental models (Colville et al., 2014). In this respect, organizational learning is acknowledged as the vexing of order in the form of cultural states inferred and maintained from past institutionalization (i.e. culture emerges out of institutionalization) against current cues of servitization. This processual analysis allows the manufacturing organization to be viewed not as a fixed entity but as dynamic, ongoing processes that determine the cultural becoming of the industrial service provider (Tsoukas and Chia, 2002). The resulting framework, shown in Figure 1, starts with the dynamics of the cultural layers at the organizational level (i.e. company, service unit), which are processed at the member level (i.e. individuals and formal or informal groups with shared commitment) to drive operations, and with the outcome flowing back and reactivating the system (Katz and Kahn, 1978).

Table 1: Literature streams integrated into the processual conceptualization of cultural change in servitization

Literature streams	Key insights for conceptualizing cultural change in servitization
Multilevel theory The interaction of individual, collective and organizational factors explains organizational behavior and performance (Klein and Kozlowski, 2000)	▪ Cultural change "originates in the cognition, affect, behaviors or other characteristics of individuals, is amplified by their interaction, and manifests as a higher level, collective phenomenon" (p. 55) ▪ Effective change emerges from lower-level sensemaking and group processes. Over time, as changes institutionalize, they set the context for perceptions and behaviors ▪ Organizational learning and sensemaking turn active and have a greater effect when the organizational situation is in a state of equivocality and flux
Organizational learning Processes of changing organizational values and operations through the modification of structures and mental models to improve performance (Argote, 2011; Argyris and Schön, 1996)	▪ Single-loop learning refers to adjustments of structures and strategies to meet contextual requirements based on the prevailing values of conducting business ▪ Double-loop learning refers to linking structural adjustments not only to the strategic orientations for achieving performance but also to questioning the value orientations that define effective performance

Intersubjective sensemaking "[A] process, prompted by violated expectations, that involves attending to and bracketing cues in the environment, creating intersubjective meaning through cycles of interpretation and action and thereby enacting a more ordered environment from which further cues can be drawn" (Maitlis and Christianson, 2014, p. 67)	▪ Sense is constructed in an ongoing process of contextual enactment, drawing from past experiences and projecting them onto potential futures to retain plausible mental models ▪ Self-identity guides the way sense is constructed and is constructed through sensemaking, involving members' reflection of possible selves and adoption of roles and perspectives ▪ Sensemaking holds two salient principles, which are bounded rationality and interaction (Weick, 2001) ▪ Bounded rationality refers to members operating with retrospective logic, simplifying mental models to apply reasonable rather than optimal strategies to justify their past actions and retain legitimacy within their social unit ▪ Committed action (i.e. public, irreversible and voluntary) forms the basis of social organization since members become dependent on interactions with others to achieve organizational goals

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2.2.2.2 Conceptualizing the organizational level of cultural change in servitization

Recognizing that servitization is a strategic effort to adapt manufacturers' internal context to *service-driven business goals*, its implementation requires a realignment of the entire culture (Dmitrijeva et al., 2020). Building on the literature on culture (Dauber et al., 2012; Ostroff et al., 2012), and prior servitization research, this framework proposes the alignment of values, strategies and structures to achieve desired *servitization outcomes* according to these goals (e.g. Ambroise et al., 2018a; Gebauer et al., 2010b; Lexutt, 2020; Li et al., 2023; Struyf et al., 2021; Yan et al., 2021).

Regarding these organizational-level dynamics, this research follows Dauber et al. (2012), who integrated highly influential accounts of organizational culture (e.g. Allaire and Firsirotu, 1984; Hatch, 1993; Homburg and Pflesser, 2000; Schein, 1985) and behavior (Argyris, 1977; Child, 1972; Fiol and Lyles, 1985; Fredrickson, 1986; Harris and Ruefli, 2000; Hatch and Cunliffe, 2006) to reconceptualize the layers of Schein (1985) as organizational values and identity, strategy and structure, explicating their interrelation as organizational learning processes. As depicted by the left part of Figure 1, this research correlates these layers with servitization aspects extracted from the literature review as *servitization values*, *servitization strategies* and *servitization structures*, employing organizational learning to elucidate service-driven cultural change processes.

According to the hierarchy in Figure 1, changing values as part of the service-driven business transformation requires learning processes that involve all levels of analysis (Wiewiora et al., 2019). Recognizing the master metaphors of continuous and radical change in servitization (Baines et al., 2020; Brax et al., 2021), learning loops are used to conceptualize the interrelated processes that trigger *changes of the product-driven organizational culture* regarding strategies (*single-loop learning*) and values (*double-loop*

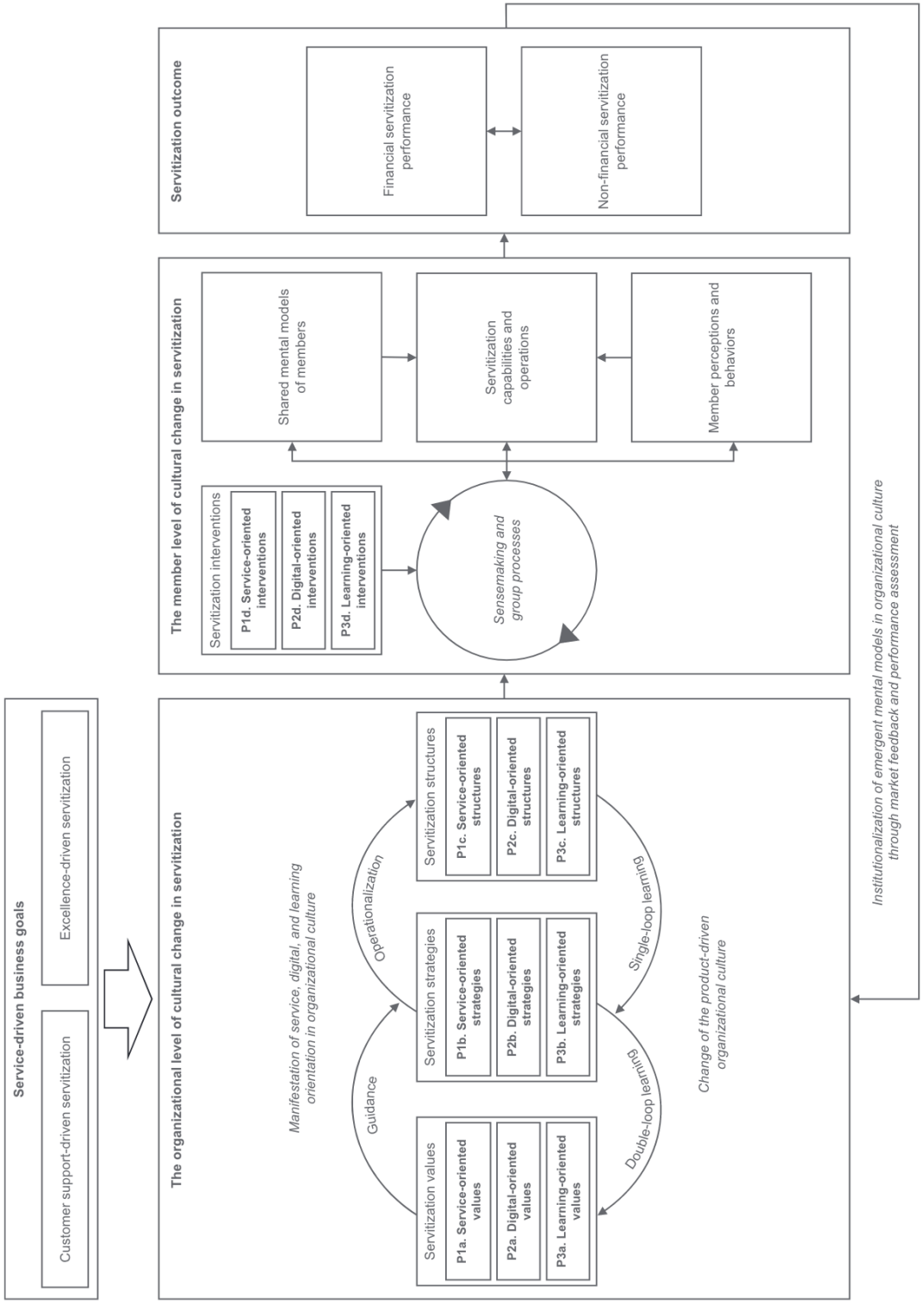
learning) in response to the *service-driven business goals*. The evolving *servitization values*, in turn, drive change toward *servitization strategies* and *servitization structures* by shaping the patterns of group processes (De Long and Fahey, 2000) and spurring members' need to find socially acceptable explanations for their new behaviors (Weick, 2001). Dauber et al. (2012) denote this process as *manifestation of new cultural orientations* by providing *guidance* during *operationalization*, which is putting the more deliberate *servitization strategies* into effect through *servitization structures* and subsequent *servitization capabilities and operations*. Because the organizational dynamics of cultural change promote effective behaviors disconnected from the product-driven culture, servitization challenges members' capacity to establish unified meanings, triggering equivocality (Weick, 2001) and subsequently provoking dissonance and resistance to servitization (Lenka et al., 2018a).

2.2.2.3 Conceptualizing the member level of cultural change in servitization

Since changing a manufacturer's culture is central to servitization, a concomitant change in members' cognition is inevitable (Neely, 2008). Following recent calls to advance the understanding of servitization based on sociopsychological insights (Kohtamäki et al., 2019; Rabetino et al., 2017), this research extends Dauber et al.'s (2012) organizational-level view of culture by incorporating the member level and introducing *sensemaking* as the foundational process underlying cultural change (Ostroff et al., 2012). As depicted by Figure 1, connecting organizational learning and members' sociocognitive processes involves *group processes* (Wiewiora et al., 2019), where collectives act, reflect upon feedback (Argote, 2011; Edmondson, 1999) and develop shared viewpoints, expectations and priorities to make sense out of the organization's functioning (Katz and Kahn, 1978; Weick, 1995). Within this level, *shared mental models*, *member perceptions and behaviors* and *managerial interventions* are comprised to understand how members, their interactions and the mechanisms and internal context that influence these interactions bring servitization into existence and effect (Orlikowski, 1996; Weick, 2001).

Sensemaking denotes the sociopsychological process of enacting equivocal transformational events characterized by multiple or conflicting meanings, the selection of dominant mental models to explain current accounts of enactment and the development of new mental models to resolve equivocality (Daft and Lengel, 1986; Weick et al.,2005); that is, how do members collectively respond to the questions of "what is the story here?",

Figure 1: Organizational learning framework for cultural change in servitization



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"what do we do next?" (Colville et al., 2014, p. 219), and ultimately, "how do we contribute to our organization's overall purpose?" (Huikkola et al., 2020, p. 102). Against the background of bounded rationality through dominant mental models (see Table 1), dissonance is expected to be fed by equivocality following simultaneously product, service and digital logics and the accompanying conflicting mental and behavioral expectations

(Lenka et al., 2018b). Building on Maitlis and Christianson (2014), radical as well as continuous changes are likely to challenge members' mental models, which are understood as lower-level mechanisms of an organization's ability to reconfigure the internal context and to overcome resistance (Helfat and Peteraf, 2015); for example, managerial mental models have been shown to be critical in developing strategic orientations (Gary and Wood, 2011). Building on Weick (2001), institutionalization emerges as members (1) adopt the service-driven business goals that justify committed actions, (2) understand the business logic to achieve the envisioned goals, and (3) validate emergent mental models by market feedback, performance evaluation and acting cautiously while envisioning the organization's joint operations. In this respect, *servitization outcome* can reactivate sensemaking and organizational learning through *market feedback* and *performance evaluation* (Dauber et al., 2012; Wiewiora et al., 2019).

Bridging the gap between members' cognition and organizational learning by developing new mental models involves "(1) making explicit an individual's mental model, and (2) providing the social architecture to identify conflicting mental models and resolve these conflicts to create shared mental models" (Wiewiora et al., 2019, p. 106). From an organizational learning perspective, this is to implement *managerial interventions* to remove belief, information and behavioral barriers (Baker and Sinkula, 2002). The goal is to transform mental models by helping members permeate new business logics, change behavioral patterns and understand how the new behaviors benefit them and drive organizational performance (Poole et al., 1989; Shah et al., 2006).

2.3 Research methodology

This article is a conceptual literature review, which "aims to reconcile and then extend past research in a particular domain in a meaningful, conceptual way" (Hulland, 2020, p. 28). To this end, an ex ante designed framework drawn from theories outside the field was applied to introduce conceptual order into the empirical complexity of cultural change in servitization (Seuring et al., 2021; Suddaby, 2014). The acquisition of literature was informed by a prior scoping study aimed at gaining an initial understanding of bibliographic characteristics and common terminologies in the relevant literature. As a result, a combined database and seminal-work-driven approach to acquisition was applied to account for a substantive fragmentation and limited bibliographic identifiability of the relevant literature, e.g. with respect to thematically broad case studies (Hiebl, 2021). An

initial overview of potentially relevant literature required searching a broad database. Therefore, this research followed leading servitization scholars in searching Scopus (Brax et al., 2021; Kolagar et al., 2022a; Raddats et al., 2019; Zou et al., 2018), which is recognized as one of the most complete databases that ensures the presence of the most relevant journals (Bilro and Loureiro, 2020; Guz and Rushchitsky, 2009). To address the limitations of the initial number of articles from searching a single database and not including other common terms for servitization, backward snowballing was performed to explore the broader research ecosystem contributing to the research questions, e.g. cultural change in the context of product-service systems and advanced services (cf. Ziaee Bigdeli et al., 2017). As presented in Table 2, the Scientific Procedures and Rationales for Systematic Literature Reviews (SPAR-4-SLR) protocol was applied to justify the results based on logical rationales and their transparent presentation by phases and subphases (Paul et al., 2021).

Table 2: Systematic research process

Phase	Subphase	Methodological approach and results of the subphases
Assembling	Identification	Definition of non-content related inclusion criteria for literature ▪ Publication outlets were restricted to academic journals as they contribute to scholarly advancement and undergo rigorous peer review (Paul et al., 2021) ▪ Language was confined to English to comply with the language commonly used in academia (Kolagar et al., 2022a)
	Acquisition	Definition of the search mechanisms applied to the literature collection ▪ Titles, abstracts and keywords in the subject-area "Business, Management and Accounting" of the Scopus database were searched in October 2022, as the review aims to contribute to this area ▪ The BOOLEAN formula "serviti*ation AND cultur*" was applied, accommodating for different spellings of servitization and comprehensive coverage of the terms culture and cultural change. The specific term "servitization" best addresses the transformation-related content within the field, which is recognized as appropriate for initial acquisition in the context of this research (Brax et al., 2021) ▪ Backward snowballing according to Wohlin (2014) was performed to screen the purified literature acquired from Scopus ⇒ 54 articles were acquired in the initial search in Scopus ⇒ 20 articles were excluded based on non-content related criteria (e.g. book chapters and conference proceedings) ⇒ 34 articles were included for arranging after excluding 20 articles based on non-content related criteria
Arranging	Organization	Definition of the codes for the arrangement of the acquired literature ▪ Manifest and latent content coding was guided by a theory-based codebook detailing organizational concepts, common lemmas, criteria and examples, with support from Zotero, MAXQDA Plus 2022 and Excel (Seuring and Gold, 2012) ▪ Coding of variables, contexts and lemmas allowed the retrieval of semantically similar concepts along with different spellings. For example, along with "centralization", which is a construct of servitization structure, the lemmas "vertical division of labor", "participation", "span of control" and "hierarchy of authority/control" were also considered (Lee et al., 2015)
	Purification	Definition of articles for inclusion and exclusion ▪ Empirical articles dealing with the predefined concepts (i.e. values, strategy, structure, mental models, interventions) in the context of manufacturing were included ▪ The decision to exclude irrelevant material was performed on the basis of the full text of the articles, rather than the abstracts, as the phenomena under study have not yet received much dedicated attention

		▪ Relevant review articles were screened for publications to inform backward snowballing, e.g. Favoretto et al. (2022) and Kolagar et al. (2022a) ▪ Backward snowballing was stopped when additional literature confirmed existing codes without revealing new ones. For example, seminal servitization literature that supports the general role of service-oriented values but does not reveal new causal relationships in this regard, e.g. Brax (2005) and Raddats et al. (2015) ⇒ 17 articles of the initial sample were excluded based on content-related criteria, e.g. focus on customer change (Sjödin et al., 2017) or national culture (Classen and Friedli, 2021) ⇒ 17 articles were included for assessing based on the initial search in Scopus 0 58 articles were added based on backward snowballing ⇒ *75 articles published between 2003 and 2023 (articles in press) were included in the final sample*
Assessing	Evaluation	Definition of the methods to analyze the articles under review ▪ Content analysis was performed in line with the conceptual framework to summarize the organized codes to the predefined level of abstraction and to reinterpret and interconnect the literature (Seuring and Gold, 2012) ▪ Reinterpretation of the organized literature was conceptually enriched by rationale culled from organizational learning and sensemaking literature in accordance with the predefined framework (Seuring et al., 2021)
	Reporting	Reporting the summary and limitations of the methodological approach ▪ The methodology ensures construct validity by applying theory-driven codes, internal validity by coding each article accordingly and external validity through a rigorous, transparent review process (Beske et al., 2014) ▪ The methodology has two major limitations ▪ This review does not systematically cover articles on the researched concepts themselves, e.g. organizational structure. This does not limit the validity of this work regarding the research questions but poses limitations in the interpretation of the results. In particular, they provide insight into how a concept is treated in the context of cultural change in servitization rather than in the general servitization literature ▪ Literature was assembled, arranged and assessed by the researchers' judgment of the relevance and conceptual fit of the sampled articles. Potential bias was minimized through theory-driven coding and discussion of the framework in research colloquia with experts from academia and industry. Still, the interests and experience of the team may have influenced the process, and other researchers may have drawn additional conclusions

Source(s): Table created by the authors

2.4 An organizational learning framework for cultural change in servitization

The articles in the sample were structured and reanalyzed based on the organizational learning framework illustrated in Figure 1, and the cultural change events were traced and coded according to servitization values, strategies and structures (organizational level) and mental models and managerial interventions (member level). The conceptual dimensions extracted from the literature can be taken from Table 3; the coded events regarding causal powers and liabilities of the concepts are presented in the following sections. Despite the considerable variety of aspects identified in the literature, the content analysis revealed that many of the constructs share common characteristics that provide the rationale for the categorization as shown in the rows of Table 3 labeled service, digital and learning orientation.

Table 3: Conceptual dimensions of cultural change in servitization

Concept	The organizational level of cultural change in servitization			The member level of cultural change in servitization	
	Servitization values	**Servitization strategies**	**Servitization structures**	**Shared mental models and behaviors**	**Managerial interventions**
Definition	"Values (1) are concepts or beliefs, (2) pertain to desirable end states or behaviors, (3) transcend specific situations, (4) guide selection or evaluation of behavior and events, and (5) are ordered by relative importance" (Schwartz, 1992, p. 4)	"Strategic orientation reflects the directions implemented by a firm to create the proper behaviors for the continuous superior performance of the business" (Gatignon and Xuereb, 1997, p. 78)	The description of expected behaviors through specialization (i.e., separate or integrated service units), centralization of decision making, formalization of rules, and integration and interdependence among units (Lee *et al.*, 2015)	"Members' shared, organized understanding and mental representation of knowledge about key elements of the [group]'s relevant environment" (Mohammed *et al.*, 2010, p. 879)	"Process of attempting to influence the sensemaking and meaning construction of others toward a preferred redefinition of organizational reality" (Gioia and Chittipeddi, 1991, p. 442)
Service orientation	*Service-oriented values* Service orientation of corporate values (Homburg *et al.*, 2003) ▪ Customer service is one of the core values of the organizational culture ▪ High-quality customer service is of similarly high importance as the quality of products ▪ Understanding the company not only as a supplier of products but as a provider of comprehensive performance bundles for the solution of customer problems ▪ Employees are aware of the importance of a comprehensive and a high-quality customer service and they act accordingly ▪ Concerns of the customers are of high importance for the employees ▪ Employees have a distinctive service mentality ▪ Employees engage strongly in the solution of customers' problems Service orientation of corporate values (Gebauer *et al.*, 2010b) ▪ Service employees understand the marketing opportunities of services ▪ Service employees are aware of the financial potential of services ▪ Service employees recognize the strategic opportunities of services ▪ Service employees consider services as the main part of value creation Service orientation of management values (Gebauer *et al.*, 2010a) ▪ Management recognizes services as a lasting differentiation strategy ▪ Management considers the combination of products and services as a potential way to improve profitability	*Service-oriented strategies* Strategic service orientation (Lin *et al.*, 2019, citing Lytle and Timmerman, 2006) ▪ Service leadership (servant leadership, service vision) ▪ Service encounter (customer treatment, employee empowerment) ▪ Service system (service failure prevention and recovery, service technology, service standards communication) ▪ Human resource management (service training, service rewards) Service strategy (Smania *et al.*, 2022, citing Fliess and Lexutt, 2019; Gebauer *et al.*, 2010b; Gebauer *et al.*, 2008; Oliva *et al.*, 2012) ▪ Commitment to services ▪ Alignment between service strategy and other business strategies ▪ Definition of service goals ▪ Organization's market responsiveness Management commitment to services (Lexutt, 2020, citing Oliva *et al.*, 2012) ▪ Clearly defined service strategy ▪ Management recognition of the potential of service business ▪ Motivation to invest time and resources in the service business ▪ Sufficient resources available to improve service processes and offerings ▪ Management wholly supports employee efforts to improve service offerings Service orientation of management behavior (Gebauer *et al.*, 2010a)	*Service-oriented structures* Collaborative service- and customer-oriented structure (Gebauer *et al.*, 2009) ▪ Intrafirm collaboration between service and product units ▪ Interfirm collaborations between manufacturers and customers ▪ Integration of business unit responsibilities Organizational distinctiveness between product and service businesses (Gebauer *et al.*, 2010b) ▪ Service business is separated from product business ▪ Service organization runs with its own profit-and-loss responsibility Organizational clarity (Oliva *et al.*, 2012) ▪ Service organization effectively provides "professional-grade" services ▪ Within the company (or relevant business unit), it is known who is responsible for services ▪ Regarding services, customers can easily find a capable contact person ▪ Within the organization, it is clear who is responsible for each service Customer interface (Ambroise *et al.*, 2018) ▪ Service production requires a complex technical customer interface system ▪ Complex customer interface due to the division of responsibility ▪ Service production requires frequent contact with customers	*Service-oriented mental models and behaviors* Behavioral managerial cognition for services (Gebauer *et al.*, 2005; Gebauer and Fleisch, 2007) ▪ Recognition of the opportunities of an extended service business ▪ Overcoming risk aversion on exploiting the strategic opportunities of services ▪ Overcoming overemphasis of obvious servitization casualties ▪ Understanding vertical competition ▪ Understanding the symbiotic potential of manufacturing and services for customer value ▪ Understanding temporal and spatial logics of services (e.g., time lags of service returns vs. immediate manufacturing results) Motivational managerial cognition for services (Gebauer *et al.*, 2005; Gebauer and Fleisch, 2007) ▪ Putting high valence on extending the service business ▪ Expectation that extending the service business will succeed in more service revenue Employee role perception and behavior (Gebauer *et al.*, 2010a; Neu and Brown, 2005; Zabala *et al.*, 2022) ▪ Serving customers as a reliable trouble-shooter ▪ Serving customers as a performance enabler ▪ Serving customers as a trusted advisor ▪ Fulfilling the role of problem solvers	*Service-oriented interventions* Remove service-oriented belief barriers (Antioco *et al.*, 2008; Huikkola *et al.*, 2020, 2022; Reim *et al.*, 2019; Zabala *et al.*, 2022) ▪ Establishing a service vision and mission ▪ Creating a sense of urgency for servitization ▪ Joint strategy formulation ▪ Rooting the service-driven change narrative in the organization's history ▪ Promoting identification overlaps with customers ▪ Emphasizing customer value ▪ Empirical validation of provisional understanding of the service business Remove service-oriented information barriers (Gebauer and Fleisch, 2007; Huikkola *et al.*, 2020; Kreye, 2016; Lenka *et al.*, 2018b) ▪ Service-oriented cost monitoring ▪ External benchmarking with other organizations or experts ▪ In-depth market information from customer functions and market research ▪ Tight feedback loops on service quality ▪ Building the transformation around customer insights (e.g., involving lead customers) ▪ Visualization and measurement of service objectives and marketing of services Remove service-oriented behavioral barriers (Gebauer *et al.*, 2010b; Gebauer and Fleisch, 2007; Kreye, 2016; Neu and Brown, 2005; Story *et al.*, 2017; Zabala *et al.*, 2022) ▪ Participatory approaches

(*continued*)

- Management uses services to reduce comparability of different suppliers' offerings
- Management aims to exploit financial potential of services
- Management sees services to compensate fluctuating product sales
- Management considers services as highly profitable

Service orientation of employee values
(Gebauer *et al.*, 2010a)
- Employees recognize the financial potential of services
- Employees try to compensate fluctuating product with service sales
- Employees consider services as highly profitable
- Employees use service to augment the product offering
- Employees use services to improve the customer relationship
- Employees use services for selling more products

Service culture
(Ambroise *et al.*, 2018)
- Service production requires good communication with customers
- Service production requires a high level of expertise that is difficult for customers to imitate
- Service production requires great experience in customer relationships
- Service production requires a high level of autonomy for frontline employees

Customer orientation
(Troilo *et al.*, 2017, citing Shah *et al.*, 2006)
- High importance of customer relationship in decision making
- High importance of customer knowledge in decision making
- High importance of customer value in decision making

Customer centricity
(Gebauer *et al.*, 2011)
- Improvements in customer satisfaction and loyalty are key drivers of running a profitable business
- Customer satisfaction has a high priority in comparison to other goals of the business
- Empowerment of service employees to respond to a broad range of customer problems
- Coaching service employees to behave in a service-oriented way
- Setting rewards for service-oriented employee behavior
- Supporting service employees for solving customer problems

Servitization strategy
(Abou-foul *et al.*, 2021)
- Top management service orientation (e.g., promotion of service vision and regularly reviews of transformational progress)
- Mobilization of resources (e.g., investment in service capabilities and linking KPIs to the roadmap)
- Market offering (e.g., taking over customer processes and outcome-based contracts)

Strategic customer orientation
(Lin *et al.*, 2019, citing Beitelspacher *et al.*, 2012; Deshpandé and Farley, 1998; Grawe *et al.*, 2009)
- Competitive strategy is based on customer insights
- Monitoring level of commitment to serving customer needs
- Business objectives are driven by customer satisfaction
- Systematically and frequent measurement of customer satisfaction
- Close attention to after-sales services

Customer-oriented mental models*
(Shah *et al.*, 2006)
- Understanding comes from living with customers
- Understanding customer loyalty is the key to long-run profitability
- Understanding marketing as an investment not as an expense

Behavioral tactics to overcome servitization resistance
(Lenka *et al.*, 2018a)
- Evangelizing to overcome cultural resistance (building awareness and convincing non-believers to adopt servitization initiatives)
- Leveraging to overcome strategic resistance (using resources and competencies to enhance efforts for servitization initiatives)
- Bootlegging to overcome structural resistance (working on servitization initiatives covertly and without authorization)
- Collaborating to overcome procedural resistance (using collegial or legal authority to overcome obstacles to servitization initiatives)
- Frequent feedback promoting transparency and inclusiveness
- Service-oriented personal skills training
- Rewards promoting service excellence
- Emotional salary
- Informal feedback
- Interdisciplinary team structures
- (Digital) interfaces spanning product and service functions

(*continued*)

	▪ Customer focus is an important strategy to improve the results of an organization ▪ Organization works to develop long and strong relationships with customers				
Digital orientation	*Digital-oriented values* Data orientation (Troilo *et al.*, 2017, citing Davenport *et al.*, 2012; operationalization adapted from Jeble *et al.*, 2018*) ▪ Treating data as tangible assets ▪ Decisions based on data rather than instinct ▪ Willingness to override intuition when data contradicts own view points Ecosystem partnership orientation (Kolagar *et al.*, 2022a) ▪ Transparency and openness ▪ Accountability and trust	*Digital-oriented strategies* Strategic digital orientation* (Kindermann *et al.*, 2021) ▪ Technological scope (leverage of technologies to realize performance) ▪ Digital capabilities (cultivation of competencies that enable digital value creation) ▪ Digital ecosystem coordination (effective interaction with stakeholders in open technological ecosystems) ▪ Digital architecture configuration (organizational design to match technological change) Digital service maturity (Kolagar *et al.*, 2022b) ▪ Digital awareness (e.g., assessing internal and external readiness) ▪ Digital service innovation ▪ Digital service mass customization (e.g., configuring product, service, and software) Digitalization strategy (Reim *et al.*, 2019) ▪ Build ability and resources to use data analytics ▪ Reorganize delivery processes through digital platforms Digitalization (Abou-foul *et al.*, 2021) ▪ Usage of digital technologies to understand customers better ▪ Marketing and selling of products and services through digital channels ▪ Usage of digital channels to provide customer service ▪ Technology-based linkages of customer-facing and operational process in new ways ▪ Core processes are automated ▪ Integrated view of key operational and customer information ▪ Usage of analytics to make better operational decisions	*Digital-oriented structures* Digital ecosystem embeddedness (Sklyar *et al.*, 2019) ▪ Close collaboration with internal and external parties for digital servitization ▪ Knowledge and information sharing via digital platforms to establish cross-party trust and interaction Centralization (Sklyar *et al.*, 2019) ▪ Centralized decision-making to scale up digital servitization through maintaining management structures, practices and routines ▪ Ensuring critical IT competences are available locally through centralization ▪ Sharing digital tools and resources across the firm for transparency and comprehensive digital servitization initiatives ▪ Achieving scalability of technologies to enable digital servitization across the firm Integration (Sklyar *et al.*, 2019) ▪ Front-end integration through digital units with global customer support to unify customer-facing technology ▪ Integration of back-end functions and roles to structure data and interconnection of information across the firm ▪ Close collaboration between service and product units and consolidation of R&D to enable digital servitization ▪ Software independence from products to extend the scope of digital servitization Back-end leveraging of information modules for platform orchestration (Cenamor *et al.*, 2017) ▪ Development of modular service offerings (e.g., blueprints for standardized modules) ▪ Setting rules for service configurations	*Digital-oriented mental models and behaviors* Big data-oriented mental models (Troilo *et al.*, 2017) ▪ Understanding the innovation potential of data convergence ▪ Understanding the big data principles of volume, variety, and velocity ▪ Understanding the temporal logics of data-driven innovation (e.g., real-time touchpoint innovation, medium structural change based on pattern spotting, strategic shifts in market segments) Managerial cognition for smart solutions (Huikkola *et al.*, 2020, 2022; Lenka *et al.*, 2018a; Töytäri *et al.*, 2018) ▪ Understanding the manufacturer as a software house ▪ Understanding the ecosystem position as opportunity to bypass intermediaries and move closer to customers ▪ Understanding the necessity to build capabilities to integrate products, services, and software for customer value ▪ Understanding the necessity of more rapidly solution development ▪ Overcoming product-driven identity and role conflicts in smart services provision ▪ Building confidence in smart services capabilities ▪ Understanding smart services as a legitimate expansion of business activities Managerial cognition for remote monitoring (Grubic and Peppard, 2016) ▪ Understanding the true capabilities of remote monitoring technology ▪ Understanding the business potential of remote monitoring technology ▪ Understanding remote monitoring technology as service instead of a product add-on Cognitive tensions from transformational paradoxes (Tóth *et al.*, 2022)	*Digital-oriented interventions* Remove digital-oriented belief barriers (Abou-foul *et al.*, 2021; Ardolino *et al.*, 2018; Bustinza *et al.*, 2018; Coreynen *et al.*, 2018; Sklyar *et al.*, 2019; Struyf *et al.*, 2021; Tronvoll *et al.*, 2020) ▪ Establishing a digital (service) vision and mission informed by the organization and the ecosystem ▪ Cross-functional rotation ▪ Contextual reasoning through data-based prediction and decision-making ▪ Experimentation and validation of data-driven behaviors Remove digital-oriented information barriers (Huikkola *et al.*, 2022; Troilo *et al.*, 2017; Tronvoll *et al.*, 2020) ▪ Fast piloting based on agile development and immediate feedback loops ▪ Providing situations to experience digital technologies ▪ Cross-functional development teams to increase mutual understanding of digital solutions Remove digital-oriented behavioral barriers (Schymanietz *et al.*, 2022; Sjödin *et al.*, 2020; Troilo *et al.*, 2017; Tronvoll *et al.*, 2020) ▪ Training and recruiting focusing on agility and digital mindsets ▪ Personal skills training ▪ Building soft skills in data functions ▪ Joint problem-solving and interdisciplinary teamwork ▪ Recombining big data analytics and extant professional experience

(*continued*)

		▪ Usage of digital technologies to increase the performance or added-value of existing products and services ▪ Launch of new business models based on digital technologies Ecosystem involvement (Kolagar *et al.*, 2022b) ▪ Ecosystem knowledge synergy (e.g., identifying knowledge complementarities with partners) ▪ Ecosystem integration (e.g., aligning relationships for coopetition) ▪ Ecosystem value co-creation (e.g., value proposition for ecosystem formation) Strategic technology orientation (Smania *et al.*, 2022, citing Kowalkowski, Kindström, *et al.*, 2013; Kroh *et al.*, 2018; Ryu and Lee, 2018) ▪ Investment in new technology ▪ Technology supporting service design ▪ Technology supporting service delivery ▪ Technology supporting quality service	▪ Optimizing global delivery processes (e.g., analyzing customer usage information for delivery support) Front-end leveraging of information modules for platform offering building (Cenamor *et al.*, 2017) ▪ Speeding up service development (e.g., adaptable sub-component offers) ▪ Flexible service offering configurations ▪ Optimizing local delivery processes (e.g., real-time monitoring of usage data)	▪ Organizing (Platform-based coopetition, digitally enabled control) ▪ Learning (Information superabundance, digital upkeep) ▪ Belonging (Organizational identity, professional identity) ▪ Performing (Performance priorities, data utilization)	
Learning orientation	*Learning-oriented values* Learning orientation (Lin *et al.*, 2019, citing Calantone *et al.*, 2002 and Sinkula *et al.*, 1997) ▪ Commitment to learning ▪ Shared vision ▪ Open-mindedness ▪ Intraorganizational knowledge sharing Innovation and entrepreneurial orientation (Frishammar *et al.*, 2019; Smania *et al.*, 2022; Zighan and Abualqumboz, 2022) ▪ Encouraging proactivity ▪ Encouraging risk-taking ▪ Encouraging commitment ▪ Encouraging change ▪ Encouraging external collaboration ▪ Improvising rather than control ▪ Inspiring a problem-solving approach ▪ Promoting continual development of new ideas and solutions to meet customer needs	*Learning-oriented strategies* Institutionalization of generative learning* (Baker and Sinkula, 2002) ▪ Institutionalize overcoming belief barriers (e.g., belief impermanence and surfacing) ▪ Institutionalize overcoming information barriers (e.g., theory-in-use scanning, hypotheses testing) ▪ Institutionalize overcoming behavioral barriers (e.g., motivation, opportunity, and ability to change) Management commitment to innovation (Smania *et al.*, 2022, citing/operationalization adapted from Anning-Dorson, 2016) ▪ Willingness to take risk and to seize and explore "chancy" growth opportunities ▪ Management involvement in idea generation ▪ Demonstrative and risk-taking attitude towards innovations to achieve excellence	*Learning-oriented structures* Organic structures* (Burns and Stalker, 1966) ▪ Flat hierarchy ▪ Low degree of formalization ▪ Loosely coupled units and groups Decentralization (Eggert *et al.*, 2014, operationalization adopted from Lexutt, 2020) ▪ Decision making authority is distributed among different hierarchical levels	*Learning-oriented mental models and behaviors* Learning-oriented mental models* (Baker and Sinkula, 2002) ▪ Understanding the potential of challenging the status-quo vs. internal costs ▪ Understanding the manipulability of mental models through hypotheses testing and dialectic Innovativeness orientation* (Ritala *et al.*, 2021) ▪ Preferring a strong emphasis in projects on unique, one-of-a-kind approaches rather than revisiting tried and true approaches used before ▪ Preferring to try own unique ways when learning new things rather than doing it like everyone else does ▪ Favoring experimentation and original approaches to problem solving rather than using methods others generally use for solving their problems Proactiveness and risk-taking orientation* (Ritala *et al.*, 2021) ▪ Usually acting in anticipation of future problems, needs or changes and initiating actions to which others respond ▪ Excelling at identifying opportunities and tending to plan ahead on projects ▪ Preferring to "step-up" and get things going on projects always trying to take the initiative in every situation ▪ Taking bold action by venturing into the unknown encouraged to take calculated risks with new ideas ▪ Willingness to invest time and/or money on something that might yield a high return taking bold, wide-ranging actions to achieve objectives	*Learning-oriented interventions* Remove belief barriers to promote impermanence of mental models* (Baker and Sinkula, 2002) ▪ Systemic perspectives (e.g., dialectic inquiry, manager rotation) ▪ Dialogue-based decision-making instead of power-coercive reconciliation processes Remove information barriers to provide compelling evidence for change* (Baker and Sinkula, 2002) ▪ Scanning for tacit structures ▪ Hypothesis generation and testing Remove behavioral barriers to provide motivation for change* (Baker and Sinkula, 2002) ▪ Motivation (e.g., rewards) ▪ Opportunities to apply new behaviors ▪ Ability (e.g., training)

***Exemplary constructs suggested to enhance the framework**

Source(s): Table created by the authors

2.4.1 Service, digital and learning orientation as the main cultural concepts in servitization

The framework adopts the concept–construct–variable logic of Van de Ven (2007) to organize hierarchies and relationships among the conceptual dimensions of cultural change extracted from the literature. Concepts (e.g. learning-oriented values) allocate constructs (e.g. learning, innovation and entrepreneurial orientation) in Table 3. Constructs, for their part, are specified by variables noted as bullets. Both constructs and variables are meant to be representative of the broader concept and are not an exhaustive list. As depicted by Table 3, this research identifies three major conceptual streams in the extant literature on cultural change in servitization. Consistent with established terminology in the fields of organizational learning, culture and servitization, these overarching conceptual streams are labeled orientations, i.e. service, digital and learning orientation (Baker et al., 2022; Homburg et al., 2003; Homburg and Pflesser, 2000). These orientations are recognized as conceptually aligned with the organizational requirements derived from Favoretto et al.'s (2022) comprehensive conceptualization of digital servitization, which are (1) to transform toward a service-driven business model (service orientation), (2) to support the use of digital technologies in these processes (digital orientation) and (3) to provide the capacity to reconfigure the manufacturer's business logics, processes and capabilities (learning orientation). Drawing on recent organizational learning research, these three orientations can serve as a template for evaluating the servitizing organization (DiBella and Nevis, 1998), where the service and digital orientations provide the direction for change, while the learning orientation is recognized as providing the cultural capacity for change processes (Baker et al., 2022).

Against this backdrop, the framework shows how cultural change toward service, digital and learning orientation constitutes institutional settings in terms of values, strategies and structures that support manufacturers' servitization-related capabilities, operations and performance, and second, how organizational learning translates the requirements of change into group processes. This institutionally constituted account of cultural change is complemented by drawing on the intersubjective processes of members. This perspective provides insight into the construction of mental models to resolve servitization-induced equivocality and supportive managerial interventions, and thus how members become both products and creators of culture in servitization.

2.4.2 Service orientation: cultivating service excellence to lead the service-driven business transformation

2.4.2.1 Service-oriented values

Servitization requires values that legitimize the fundamental direction of the transformation toward a service-driven organization. Accordingly, the abstract value of the financial, strategic and marketing potential of services constitutes the "savoir-être" of servitized organizations and their members (Ambroise et al., 2018a; Gebauer et al., 2010a, b; Homburg et al., 2003). Extant literature demonstrates the role of developing service-oriented values as a non-negotiable necessity to achieve overall performance in both customer support- and excellence-driven servitization, overcome resistance from traditional product orientation and build service capabilities and operations (Ambroise et al., 2018a, b; Brax, 2005; Burton et al., 2017; Coreynen et al., 2017; Gebauer et al., 2010a; Homburg et al., 2003; Lexutt, 2020; Li et al., 2023; Martinez et al., 2017; Raddats et al., 2015; Yan et al., 2020, 2021). Although not initially necessary for financial success in basic service provision, the literature highlights the importance of developing service orientation throughout the organization to support effective collaboration within the structure of industrial service providers when adopting increasingly complex services (Ambroise et al., 2018a; Kohtamäki et al., 2015; Lexutt, 2020; Salonen, 2011; Story et al., 2017). Comparable conclusions apply to customer orientation, which is crucial for the inherently co-creative character of excellence-driven servitization (Ambroise et al., 2018a; Frishammar et al., 2019; Gebauer et al., 2011; Grubic and Peppard, 2016; Kowalkowski et al., 2013a, b; Neu and Brown, 2005; Schymanietz et al., 2022). Because the customer can be viewed as the "pivot" where data and value creation converge, customer orientation plays a unique role in members' sensemaking of the opportunities of data analytics in digital servitization (Troilo et al., 2017, p. 636). Given the pervasive and widely recognized threat that high strategic commitment can lead to servitization failure if employees are not service-minded and motivated (cf. Calabrese et al., 2019), this research proposes:

> *P1a. Service-oriented values:* Manufacturers pursuing service-driven business goals need to develop service-oriented values that increase their propensity to engage in service innovation by guiding strategic efforts toward service-driven business goals and thus serve as a benchmark for measuring the organization's transformation to a service-driven business paradigm.

2.4.2.2 Service-oriented strategies

Strategic service and customer orientation refers to policies and measures designed to create service excellence and build the organization's long-term profitability on customer value (Deshpandé et al., 1993; Lytle et al., 1998). These concepts set the stage for transformation by promoting the foundational premises of the service-dominant logic that "service is the fundamental basis of exchange" and that "the customer is always a cocreator of value" (Lin et al., 2019, p. 295). In this regard, Lexutt (2020) identifies managerial commitment of time and resources to service as a necessary condition for overall performance in both customer support and excellence-driven servitization. Moreover, the positive effect of related constructs listed in Table 3 has been demonstrated for service innovation, leadership, operations and cultivation, as well as technology strategy implementation (Gebauer et al., 2010a; Gebauer and Fleisch, 2007; Kohtamäki et al., 2015; Lin et al., 2019; Smania et al., 2022). A prominent theme in excellence-driven servitization found to impact overall performance is service-oriented HR, which provides complementary practices to enhance members' service-oriented cognition, skills and enthusiasm (Homburg et al., 2003; Li et al., 2023; Yan et al., 2020, 2021). As a seminal mechanism for translating the service-driven transformation into group processes, HR strategy requires "persistent adjustment based on the current state, such as employees' mental models, beliefs, value, as well as business capabilities related to services" (Yan et al., 2021, p. 11). Given the centrality for aligning service-driven business goals, member behaviors and cognitions and customer needs (Alghisi and Saccani, 2015), this research proposes:

> *P1b. Service-oriented strategies:* Manufacturers pursuing service-driven business goals need to make the implementation of service orientation a strategic priority to direct operations and learning processes toward the service business and, therefore, to foster the development and reinforcement of service-oriented values.

2.4.2.3 Service-oriented structures

Service- and customer-oriented structures focus on fostering intraorganizational collaboration between product and service units, integrating responsibilities across units and developing interorganizational collaboration by moving from product-centric profit centers to highly integrated customer interfaces within the product-service system (Ambroise et al., 2018a, b; Gebauer et al., 2009; Gebauer and Kowalkowski, 2012; Neu and Brown,

2005). Despite the proliferation of various product- or service-dominant forms of integration in the early stages of servitization, the creation of separate service units has been widely defended as a seminal mechanism for driving service orientation, e.g. by mediating positive effects of commitment on servitization performance and increasing service orientation in values, strategy and HR (Gebauer et al., 2010a, b, c; Gebauer et al., 2005, 2009; Gebauer and Pütz, 2009; Neu and Brown, 2005; Oliva et al., 2012; Zighan and Abualqumboz, 2022). In this respect, separation promotes cultural ambidexterity by balancing product- and service-oriented values and avoids resistance to change by allowing service-oriented values to continuously evolve without radically substituting one value system for the other (Antioco et al., 2008; Gebauer et al., 2009; Story et al., 2017). However, especially in excellence-driven servitization, the service orientation must extend, at least partially, throughout the organization to support interconnected product-service-software systems (Ambroise et al., 2018a; Tronvoll et al., 2020). Drawing on recent organizational learning research emphasizing the distinct learning capacity of newly implemented units (Hartnell, 2012) and the potential of ambidextrous learning as a mechanism for (joint) exploration and transfer of service orientation between service units and the broader organization (Brix, 2019a), this research proposes:

> *P1c. Service-oriented structures:* Manufacturers pursuing service-driven business goals need to build structures that foster intraorganizational and customer collaboration to effectively operationalize the service orientation in terms of utilizing ambidextrous learning and feedback loops from service interactions.

2.4.2.4 Member level of service orientation

The implementation of service orientation in product-driven organizations creates a state of organizational ambivalence. This translates into group processes that challenge various aspects of membership and can feed resistance but also serve as a springboard for reshaping cognitive and behavioral patterns (Lenka et al., 2018b). Moving from this state of flux to enabling operations in line with service-driven business goals requires members to permeate new service business logics and develop service identities, roles, outside-in perspectives and behavioral tactics to deal with resistance (Coreynen et al., 2018; Gebauer et al., 2005; Gebauer and Fleisch, 2007; Huikkola et al., 2020, 2022; Lenka et al., 2018a, b; Neely, 2008; Zabala et al., 2022). From a managerial perspective, it is essential to move beyond outdated success formulas such as preference for tangible features and understand

the significant role that service revenue can play in a manufacturer's value proposition that exceeds the cost of internal resistance (Gebauer and Fleisch, 2007). From an operational perspective, product-oriented thinking employees are challenged by the transformation as it requires them to understand new processes and relationship logics and develop a skillset focused on customer solutions (Kreye, 2016; Lenka et al., 2018a; Matthyssens and Vandenbempt, 2010; Zabala et al., 2022).

To attempt belief-related challenges, establishing a comprehensive service vision can be powerful in customer support- and excellence-driven servitization for promoting the impermanence of the product-driven culture (e.g. Antioco et al.,2008; Zabala et al., 2022). However, especially in customer support-driven servitization, a more balanced approach that aligns with prevailing manufacturing values can reduce complexity and improve synergies between service and product orientation (Zighan and Abualqumboz, 2022). By removing information barriers, members experience service-oriented efficiency and identify discrepancies between outdated product-oriented approaches and current market conditions (e.g. Gebauer and Fleisch, 2007; Kreye, 2016). Finally, behavioral change barriers can be overcome by creating strong emergent situations (as characterized by Mischel, 1973) through participatory approaches and complementary interventions such as emotional salary and social rewards that stimulate service- and customer-oriented identification processes (Kreye, 2016; Zabala et al., 2022). Given the fundamental differences between products and services (Drejer, 2004) and the subsequent need to shape servitization operations through collective changes in accepting or rejecting information based on mental models (Slater and Narver, 1995), this research proposes:

> *P1d. Service-oriented interventions:* Manufacturers pursuing service-driven business goals need to intervene in group processes to shape members' mental models and behaviors to support the bottom-up emergence of service orientation by helping them overcome product-driven belief, information and behavioral barriers.

2.4.3 Digital orientation: cultivating digitalization to empower the service-driven business transformation

2.4.3.1 Digital-oriented values

Digital servitization requires values that legitimize the adoption of digital technologies and interorganizational digital ecosystems (Favoretto et al., 2022). Building on literature

from outside the field, this research introduces digital-oriented values underlying organizations that successfully transform their value-creation processes through digitalization strategies (Davenport et al., 2012; Khin and Ho, 2018; Kindermann et al., 2021). This aligns with extant servitization literature, which indicates that a lack of values that embrace technology can prevent advanced service development (Ardolino et al., 2018; Bustinza et al., 2018; Coreynen et al., 2017; Grubic and Peppard, 2016; Salonen, 2011). In this context, data and digital orientation are emphasized to legitimize digitalization strategies and support, among others, digital information sharing and the development of data analytics and platform capabilities (Grubic and Peppard, 2016; Schymanietz et al., 2022; Troilo et al., 2017). Literature urges the dissemination of data orientation among non-data functions, as it can help members to better understand customer needs (Troilo et al., 2017) and to make sense of accelerated software-driven development cycles and digital infrastructure requirements (Tronvoll et al., 2020). Digital ecosystem transformation is another digital servitization requirement strongly driven by cultural preconditions; a comprehensive overview of empirical servitization literature indicating ecosystem-related values can be taken from the literature review of Kolagar et al. (2022a). These partnership-oriented values revolve first around transparency and openness to promote data and knowledge sharing (Gebauer et al., 2017; Kamalaldin et al., 2020, 2021; Kolagar et al., 2022b; Naik et al., 2020) and second, around accountability and trust to overcome resistance to ecosystem disclosure (e.g. Chen et al., 2021; Sklyar et al., 2019b) and improve self-reinforcing mechanisms that increase mutual trust among ecosystem parties (e.g. Abou-foul et al., 2021; Tian et al., 2022). Given the centrality to legitimize the nurturing and operationalization of digitalization-related aspects of the transformation, this research proposes:

> *P2a. Digital-oriented values:* Manufacturers pursuing service-driven business goals need to develop digital-oriented values that increase their propensity to engage in digital (ecosystem) innovation by guiding strategic efforts toward a digitally empowered approach to service-driven business goals and thus serve as a benchmark for measuring the organization's transformation to a software-driven business paradigm.

2.4.3.2 Digital-oriented strategies

Leveraging data enables new strategies for the intersection of manufacturing, services and software development (Kowalkowski et al., 2013a). Following recent advances in

strategic management, Kindermann et al. (2021, p. 646) introduce a measure of digital orientation, which refers to "a strategic orientation of firms that caters to changes induced by digital technology." The concept is considered to set the stage for transformation by directing major tasks in digital servitization, among others, to leverage technological scope to achieve performance (Abou-foul et al., 2021; Ardolino et al., 2018; Coreynen et al., 2017; Genzlinger et al., 2020), to cultivate data usage competencies for data-driven co-creation, resource integration, smart services and platforms (Cenamor et al., 2017; Huikkola et al., 2020; Lenka et al., 2017; Schymanietz et al., 2022; Smania et al., 2022), to coordinate interaction within product-service-software ecosystems and to reconfigure the front- and back-end architecture (Bustinza et al., 2018; Hein et al., 2019; Kolagar et al., 2022b; Reim et al., 2019; Sjödin et al., 2020; Sklyar et al., 2019a, b). Consistent with the debate on service-oriented strategies, HR strategies should reflect digital orientation as incumbent manufacturers increasingly require IT-like workforce qualifications (Huikkola et al., 2022; Schymanietz et al., 2022; Tronvoll et al., 2020). Considering the scope of factors affected and the pervasiveness of digitalization, which undermines the advantages of previously studied strategic orientations (Kindermann et al., 2021), this research proposes:

> *P2b. Digital-oriented strategies:* Manufacturers pursuing service-driven business goals need to make the implementation of digital orientation and its consequent alignment with service orientation a strategic priority to direct operations and learning processes toward a digitally empowered service business and, therefore, to foster the development and reinforcement of digital-oriented values.

2.4.3.3 Digital-oriented structures

Digitalization is significantly changing the role of product and service units, especially with respect to internal back-end centralization and the development of agile service front-ends to accommodate embeddedness in rapidly changing ecosystems (Ardolino et al., 2018; Cenamor et al., 2017; Coreynen et al., 2017; Sjödin et al., 2022; Sklyar et al., 2019b; Struyf et al., 2021). Consistent with the separation debate in service-oriented structures, digital servitization benefits from specialized but highly integrative digital service and data units operating within an agile, learning-oriented and collaborative structure that fosters intense knowledge-sharing (Bustinza et al., 2018; Genzlinger et al., 2020; Huikkola et al., 2022; Sklyar et al., 2019b; Struyf et al., 2021). This includes overcoming

resistance to digital servitization (Ferreira Junior et al., 2022), preventing data silos (Schymanietz et al., 2022) and facilitating firsthand digitalization experiences that enable members to work differently, explain their journeys and scale learning toward digital service culture (Tronvoll et al., 2020). In this context, integrative separation fosters cultural ambidexterity through back-ends (e.g. data centers and R&D) that leverage centralized IT assets for scalable analytics and platform activities tightly coupled with front-ends (e.g. market and sales units) that cultivate exploration of customized service configurations through less formalized innovation paths (Genzlinger et al., 2020; Rapaccini et al., 2020; Reim et al., 2019; Sklyar et al., 2019b; Troilo et al., 2017; Tronvoll et al., 2020). In this respect, ambidexterity per se is not a driver of digital servitization, but rather, the high level of exploration (e.g. to continuously connect products) necessary for digital servitization requires a medium level of exploitation (e.g. standardization through cloud computing) (Coreynen et al., 2020). As this involves formally customer-facing service aspects being increasingly delivered remotely, Cenamor et al. (2017) find the apt metaphors of back-end "orchestrators" and front-end "builders" to illustrate these changing roles, especially for platform-based industrial service providers. Drawing on organizational learning research to understand digital-oriented structures as organizational information systems that facilitate sensemaking of the digital transformation by providing decision support and rapid feedback to revise interpretation and retain meaning (Ellis et al., 2011), this research proposes:

> *P2c. Digital-oriented structures:* Manufacturers pursuing service-driven business goals need to build structures that foster intraorganizational integration of centralized back-ends with decentralized front-ends and digital ecosystem coordination to effectively operationalize the digital orientation in terms of utilizing ambidextrous learning and feedback loops from remote service and ecosystem interactions.

2.4.3.4 Member level of digital orientation

Consistent with the service orientation debate, digital servitization creates paradoxes that challenge members' understanding of the organization and its role in digital ecosystems, opening avenues to change the way they perceive and interact with digital technologies (Struyf et al., 2021; Tóth et al., 2022). Digital empowerment of operations requires members to become aware of the opportunities of data in service-driven manufacturing, permeate new digital business logics to accept and use digital services as new means of value

creation, adopt an ecosystem perspective and enhance engineering with agile developer mindsets (Frishammar et al., 2019; Grubic and Peppard, 2016; Huikkola et al., 2020, 2022; Lenka et al., 2018a; Schymanietz et al., 2022; Töytäri et al., 2018; Troilo et al., 2017). Regarding the latter, Huikkola et al. (2022, p. 10) find the apt description of moving more from the traditional engineering view of "well-planned is half done" toward "scaling fast or failing fast." From a managerial perspective, it is essential to resolve tensions from integrating manufacturing, service and software logics and permeating data-oriented decision-making (Tóth et al., 2022). This might require revealing outdated selections of innovation logics for business problems, e.g. regarding the potential of data convergence for existing service processes, customer experience and future service business development (Troilo et al., 2017). From an operational perspective, employees may be resistant to leveraging the opportunities offered by digital technologies as it may require them to develop new skills to process the information generated by these systems and apply the data in the right way to innovate internal processes and customer solutions (Grubic and Peppard, 2016).

The concept of radical change, in which change agents intentionally create new conditions, is central to digital servitization. Accordingly, the literature emphasizes the importance of leadership in addressing belief-related challenges, such as legitimizing change by establishing a shared digital vision (Abou-foul et al., 2021; Bustinza et al.,2018; Huikkola et al.,2020; Tronvoll et al.,2020). Tronvoll et al. (2020) recommend that the digitally oriented vision must be informed by the organization and its business ecosystem, taking into account the increased openness and transparency of digitalization. In this regard, rotating dedicated change agents across functions and customers, coupled with collective outputs such as co-authored whitepapers, is a powerful approach to sustaining the vision through collective inquiry, gaining legitimacy, overcoming resistance and creating a platform for committed action. As in service-oriented interventions, collaborative approaches, including joint problem-solving and interdisciplinary teamwork, are effective interventions to overcome interunit trust issues, promote knowledge exchange and achieve consistent mental models in data-driven innovation (Schymanietz et al.,2022; Tronvoll et al., 2020). Given the specificities of datafication, such as dematerialization, which affects the business logic of digital-oriented organizations (Lycett, 2013) and calls for changes in mental models by transforming data into real-world business

solutions and making it actionable in social contexts (Troilo et al., 2017), this research proposes:

> *P2d. Digital-oriented interventions:* Manufacturers pursuing service-driven business goals need to intervene in group processes to shape members' mental models and behaviors to support the bottom-up emergence of digital orientation by helping them overcome analogous belief, information and behavioral barriers.

2.4.4 Learning orientation: cultivating readiness for the service-driven business transformation

2.4.4.1 Learning-oriented values

Servitization requires values that legitimize both continuous changes toward customer support-driven servitization and radical change toward excellence-driven servitization (Brax et al., 2021). To cope with both, an organization should be capable of continuous adaption (Weick and Quinn, 1999), which resonates well with learning orientation as "the values behind openness, experimentation, improvisation and continuous learning" (Battistella et al.,2020, p. 19). Combining the values that determine organizational learning, the concept "embodies the degree to which firms are committed to systematically challenging the fundamental beliefs and practices that define the innovation process itself" (Baker and Sinkula, 1999, p. 296). Drawing on the social capital theory of innovation, Lin et al. (2019) show that learning orientation (Calantone et al., 2002; Sinkula et al., 1997) is central to manufacturers' service innovation but has no direct impact on financial or non-financial performance measures. This aligns with Baker et al.'s (2022) seminal conceptualization of the construct as an initiator or moderator of strategic orientations rather than a direct driver of innovation and performance. Except for Lin et al. (2019), servitization literature predominantly addresses learning through innovation-oriented and entrepreneurial values. This research groups these orientations under the concept of learning-oriented values because of their common and broad focus on sensing and seizing opportunities; discrimination of these constructs and a conceptualization of their relationships in the context of organizational learning can be taken by Baker et al. (2022). Building on Weick and Quinn (1999), these constructs are asserted to hold multiple emergent changes together by legitimizing nonconforming (service-driven) behaviors in early transformational stages where products drive the organization's revenue (Zighan and Abualqumboz, 2022). In excellence-driven servitization, innovation orientation supports

radical breaks in strategies and structures. This is to overcome product-driven rigidities and silo thinking and to guide the operationalization of agile structures that support openness to exploring new ways of delivering value through digital services, change readiness, the development of service-, customer- and digital-oriented mindsets and data analytics capabilities (Bustinza et al., 2018; Chen et al., 2022; Ferreira Junior et al., 2022; Frishammar et al., 2019; Huikkola et al.,2020; Sjödin et al., 2020; Sklyar et al., 2019a; Smania et al., 2022; Tronvoll et al., 2020). Given the central role of learning-oriented values in challenging outdated mental models and subsequently in determining the radicality and sustainability of cultural change (Baker et al., 2022; Wolf et al.,2022), this research proposes:

> *P3a. Learning-oriented values:* Manufacturers pursuing service-driven business goals need to develop learning-oriented values that increase their propensity to engage in learning loops toward excellence-driven servitization by influencing or moderating the impact of service and digital orientation on learning outcomes and thus serve as a benchmark for measuring the organization's change readiness.

2.4.4.2 Learning-oriented strategies

Lin et al. (2019) approach the learning-orientation construct (Calantone et al.,2002; Sinkula et al., 1997) at the strategic level to understand service innovation in manufacturing. However, the present research agrees with recent advances in organizational learning to approach the construct as a moderator of strategic orientations at the value level; Baker et al. (2022, p. 863) indicate that it "is not a strategic orientation per se because it influences the quality of informational inputs into strategic planning, not their focus. That is, [learning orientation] does not direct firms towards a particular strategic approach as do strategic orientations." However, values and behavior change are at the very heart of strategy (Collier et al., 2004; Hutzschenreuter and Kleindienst, 2006), which can pose a significant challenge in manufacturing structures that prioritize efficiency and economies of scale (Kohtamäki et al., 2015). The postulated positive effect of management commitment to innovation on service innovation has not yet been demonstrated (Smania et al., 2022). Drawing on seminal organizational learning literature, an organization's propensity to innovate is a positive function of its institutionalization of generative learning behaviors. This enables members to overcome belief, information and behavioral barriers to transformation by embracing deeper change through multilevel learning, structural

knowledge fluidity and the development of learning-oriented values (Baker and Sinkula, 2002). Against the background that learning-oriented values, which determine the radicality of cultural change, are more developed in organizations that have already undergone strategic change (Alas and Sharifi, 2002), this research proposes that:

> *P3b. Learning-oriented strategies:* Manufacturers pursuing service-driven business goals need to make the institutionalization of generative learning behaviors a strategic priority in the early stages of servitization to foster the development and reinforcement of learning-oriented values for radical change in more advanced stages of transformation.

2.4.4.3 Learning-oriented structures

From a structural view, learning orientation refers to organizational designs that possess characteristics to support organizational learning authentically (Preskill et al., 2001). Burns and Stalker's (1966) distinction between mechanistic and organic structures (i.e. high vs low degrees of centralization and formalization and loosely coupled specialized units) figures centrally in servitization and organizational learning literature. Organic structures are widely recognized as most appropriate for cultural change (Fiol and Lyles, 1985; Sitar and Škerlavaj, 2018), as they encourage idea dissemination, wider exploration of solutions and institutionalization of lower-level members' operations (Wiewiora et al., 2019). This resonates with extant servitization literature, which demonstrates the necessity of flatter structures and information fluidity to achieve overall performance in both customer support- and excellence-driven servitization, drive strategic agility, deal with the complexities of structural interdependence and disseminate service- and digital-oriented thinking (Bustinza et al., 2015; Eggert et al., 2014; Lexutt, 2020; Neu and Brown, 2005; Troilo et al., 2017; Tronvoll et al., 2020; Zabala et al., 2022). Following recent organizational learning literature, organic systems correlate with innovation capacity building to empower members to decide when to switch between exploring and exploiting new thinking and behaviors, providing the internal context for ambidextrous organizational learning (Brix, 2019a, b; Burns and Stalker, 1966). This is important because servitizing organizations aim to exploit their learning outcomes, which requires managing structural trade-offs between cross-functional integration and specialization (Frishammar et al., 2019). Specifically, this balance allows service (innovation) units to foster a more

exploratory culture, while product units and digital service back-ends, driven by centralization and formalization, foster a more exploitative culture (Gebauer et al., 2009; Genzlinger et al., 2020; Story et al., 2017; Troilo et al., 2017; Tronvoll et al., 2020). Emphasizing the indispensability of an organic structure for the effective operationalization of learning orientation, this research proposes:

> *P3c. Learning-oriented structures:* Manufacturers pursuing service-driven business goals need to build organic structures to effectively operationalize the learning orientation in terms of supporting ambidextrous organizational learning and feedback loops from operations.

2.4.4.4 Member level of learning orientation

While previous research provides cues to the underlying mechanisms of service- and digital-oriented mental models and supportive interventions, it lacks insight into building learning orientation from the bottom-up to support the service-driven transformation in manufacturing. That is, providing systematic knowledge on how members develop mental models to embrace change per se and readiness to implement service- and digital-oriented thinking in planning and operations. In this regard, organizational learning research provides references to mechanisms underlying learning-oriented mental models in ongoing radically innovating organizations, as well as interventions to institutionalize generative learning behaviors by establishing a shared epistemology for removing barriers to change in beliefs, information and behavior (Baker and Sinkula, 2002). From a managerial perspective, this could mean permeating the potential of changing the status quo versus inertia to embrace committed action and overcome bounded rationality. Against the backdrop of the necessity to instill learning-oriented mental models as a prerequisite for the emergence of a learning-oriented culture by promoting the impermanence of mental models (belief barriers), compelling evidence for change (information barriers) and providing change motivation (behavioral barriers), this research proposes:

> *P3d. Learning-oriented interventions:* Manufacturers pursuing service-driven business goals need to intervene in group processes to shape members' learning-oriented mental models and behaviors to support the bottom-up emergence of learning orientation by helping them build a shared epistemology to overcome belief, information and behavioral barriers to change.

2.5 Contributions, limitations and research opportunities

This research represents the first conceptual review of the empirical servitization literature to extend the theoretical baseline of cultural change in servitization. To this end, this article provides both theoretical and managerial contributions and opens opportunities for future research.

2.5.1 Theoretical contributions

This research provides two major theoretical contributions in line with the research questions. First, the disparate literature on cultural change in servitization was assembled, arranged and synthesized to make it applicable to the extension of the field from a social constructivist perspective. Second, the synthesized literature was integrated into the organizational learning framework for cultural change in servitization to serve as a theoretical baseline for developing the field of servitization.

2.5.1.1 Extending the scope of systematic knowledge on cultural change in servitization

Despite the extensive servitization knowledge base that has emerged in recent decades, insufficient research has focused on managing the change processes required to address the challenges faced by academics and managers (Baines et al., 2017, 2020). However, the field of servitization is highly fragmented, resulting in a large number of articles that implicitly contribute to specific areas of interest, such as cultural change. For example, servitization research tends to be dominated by descriptive and thematically broad case studies that contribute to a variety of aspects of the transformation (Brax and Visintin, 2017; Rabetino et al., 2018; Salonen et al., 2021b), limiting opportunities to leverage existing knowledge for future research systematically. At the same time, descriptions of the related phenomena often remain inadequate, making literature reviews an important tool for capturing and revisiting disparate knowledge as a whole (Baines et al., 2017; Brax et al., 2021; Brax and Visintin, 2017; Kolagar et al., 2022a).

Considering the above drawbacks, this research responds to the recent call of Kohtamäki et al. (2019) to investigate the impact of (digital) servitization on manufacturing culture by capturing the disparate knowledge from relevant sources of reliable quality as a whole to extend the scope of systematic knowledge on cultural change in servitization (cf. Brax and Visintin, 2017). Applying a framework-guided snowballing approach to an initial

sample of seminal articles allowed for a review of relevant articles far beyond bibliographic identifiability through keyword searches in regular databases. This is well demonstrated by comparing the initial sample of 17 peer-reviewed journal articles from Scopus that mentioned servitization and culture or cultural change in their title, abstract or keywords with the final sample of 75 articles recognized as contributing to the topic. The predefined framework not only provided inclusion criteria for articles but also imposed conceptual order on the heterogeneity of constructs identified in terms of values, strategies, structures (organizational level), mental models and managerial interventions (member level), defining key building blocks of cultural change theory (Dauber et al., 2012; Klein and Kozlowski, 2000; Ostroff et al., 2012). The variety of potentially interacting constructs in Table 3 is a step toward disentangling the complexities of defining the industrial service culture phenomenon, as identified by Nuutinen and Lappalainen (2012). Synthesizing these heterogeneous constructs under homogenous concepts provides researchers and managers with a coherent language in terms of the concept–construct–variable logic of Van de Ven (2007) to develop novel propositions, derive hypotheses and identify research gaps.

2.5.1.2 Integrating extant knowledge into the organizational learning framework for cultural change in servitization

Complementing Kohtamäki et al.'s (2019) call for research to better explain cultural change in servitization, recent servitization literature has emphasized the need to develop more holistic frameworks that seek to trace change through social processes across multiple organizational levels (Lenka et al., 2018a, b; Paschou et al., 2020; Rabetino et al., 2017; Struyf et al., 2021).

This research responds to the above calls by integrating the extended scope of systematic knowledge into the organizational learning framework for cultural change in servitization. In the first step, this is achieved by introducing two interrelated concepts of social construction (i.e. organizational learning and sensemaking) into an overarching framework to conceptualize a processual view of servitizing organizations. Consistent with influential streams of organizational science (Ostroff et al., 2012; Schein and Schein, 2017; Scott, 2014; Weick, 2001), the framework suggests these concepts to underlie cultural change in servitization and provides the processual underpinnings that link service-driven business goals to the organization's culture, members and outcomes. In doing so, this

research addresses the common underutilization of established theories to develop servitization research (Kohtamäki et al., 2019; Rabetino et al., 2018) and provides a better understanding of the nomological network that integrates the key building blocks of cultural change theory with those previously considered in the servitization literature, as outlined below (Ellis et al., 2011; Seuring et al., 2021).

The framework elaborates on previous theorizing and research on organizational orientations governing successful servitization (Lin et al., 2019; Zighan and Abualqumboz, 2022). Through the framework-guided content analysis many of the constructs identified in the review share conceptual commonalities that contribute to the requirements of digital servitization (Favoretto et al., 2022). The proposed conceptual streams integrate longstanding service- and relationship-related accounts of servitization as service orientation (Gebauer et al., 2010a; Homburg et al., 2003), recognize the unique role of digitalization as digital orientation (Kohtamäki et al., 2019) and denote learning orientation as an integrative capability to embrace and translate the previous orientations into transformational outcomes toward service-driven business goals (Baker et al., 2022; Lin et al., 2019). Moreover, drawing in the vein of recent servitization research (Lenka et al., 2018a, b; Struyf et al., 2021), this research recognizes cultural change as a multilevel phenomenon by integrating the extended scope of systematic knowledge within the organizational and member level. Building on Molina-Azorín et al. (2020), this multilevel conceptualization contributes to the second research question by facilitating interdisciplinary theory integration to extend the field's theoretical baseline. Second, it bridges the science-practice gap that reflects the prevalence of single-level oversimplifications of managerial on-the-ground realities that imply variables and interventions at multiple levels. Finally, by integrating service, digital and learning orientation at both organizational and member levels, this research contributes a series of propositions regarding servitization values, strategies, structures and interventions, collectively represented as the organizational learning framework for cultural change in servitization, rethinking cultural change processes as manufacturers become industrial service providers.

2.5.2 Managerial contributions

Managers in servitizing organizations "invariably seek guidance concerning implementing change" through prescriptive agendas (Baines et al., 2017, p. 259). Therefore, this research also contributes to change management seeking to apply the organizational learning framework for cultural change in servitization. Tying in with Molina-Azorín et

al. (2020), the framework can support managers facing the complexity of the multilevel nature of cultural change. In this regard, the framework provides them with 12 interrelated propositions for managing change at both the organizational and member level, which can be summarized as follows. At the organizational level, managers in servitizing manufacturers need to, first, develop service-, digital- and learning-oriented values to benchmark the transformation; second, make the implementation of these orientations a strategic priority; and third, build structures that effectively operationalize them. At the member level, managers need to intervene in group processes to shape members' mental models and behaviors to support the bottom-up emergence of service, digital and learning orientation in organizational culture.

Based on this condensed four-point agenda, this research encourages managers to mindfully envision a service, digital and learning orientation when developing dedicated change programs according to specific service-driven business goals. In doing so, they should think in terms of synergies and mutual reinforcement of these orientations by taking an integrative approach to redesigning values, strategies and structures. In this respect, the central lever for senior management is to focus on strategic implementation and ensure the operationalization of these orientations, e.g. through middle managers translating transformation requirements into group processes (Balogun and Johnson, 2004, 2005). As touched in the introduction, integrating societal and service-driven goals into change agendas can help managers address increased stakeholder awareness through transformative B2B services (Rosenbaum et al., 2011; Zhang et al., 2022). Thus, the framework can be applied to approach cultural change as a means to implement employee and customer satisfaction (Zhang et al., 2022), stakeholder collaboration (Bustinza et al., 2019), circularity (Kreye, 2023) and sustainability (Coffay and Bocken, 2023) by design. Special emphasis should be placed on digital strategizing to empower ecosystem integration, e.g. for insight-driven customer experience (Zaki, 2019) and remote optimization of customer resources (Raddats et al., 2022).

With specific reference to proposition *P3b. Learning-oriented strategies*, early transformational efforts should be accompanied by an organizational learning strategy, as learning-oriented values not only evolve with change but also provide a facilitating context for members to move toward service and digital orientation (Alas and Sharifi, 2002; Baker et al., 2022). Tightly coupled with developing a learning organization, the framework could also convince engineering-minded managers that interventions to overcome belief,

information and behavioral barriers will help them to overcome member-level resistance and to improve financial and non-financial outcomes. Finally, by decomposing the complexity of cultural change in the framework, communication among change parties in different units and hierarchical levels could be enhanced, thereby improving effectiveness and efficiency in terms of shared learning in response to perceived changes in core task demands when pursuing service-driven business goals (Nuutinen and Lappalainen, 2012).

2.5.3 Limitations and research opportunities

This research acknowledges several limitations, specifically related to the research subject, the methodology applied and the conceptualization of the framework. First, due to the multifaceted and interdisciplinary nature of servitization and cultural change, the review tends to operate in part at a general level, favoring breadth over depth (e.g. with respect to differences in company size or industry specifics). Second, as noted in Table 2, other researchers may have found different articles or conclusions relevant to the research questions, but it may not be feasible nor necessary to include every article, leading to confidence that the systematically identified articles are representative of the framework (Bakker, 2010; Kolagar et al., 2022a). Third, the conceptualization based on secondary data limits this study, particularly regarding social mechanisms, which are difficult to conceptualize and describe. As a result, the propositions' significance may be limited, providing opportunities for future research, as discussed below.

Building on the condensed four-point agenda of propositions from the previous section, this study encourages future researchers to capitalize on the inherently integrative nature of the multilevel organizational learning framework. Researchers approaching servitization from different perspectives, such as strategic management or social psychology, will have broad opportunities to relate their work to cultural change processes. This invites further propositions and refinement of existing knowledge by applying additional theories from outside the field to narrow the phenomena at play through mid-range theorizing (Kohtamäki et al., 2019; Rabetino et al., 2018). Specifically, this research encourages an integrative view to examine interrelated phenomena at the organizational and member level separately and in conjunction.

Despite considerable previous research at the organizational level, the framework urges a more integrative perspective on the alignment of values, strategies and structures with respect to how service, digital and learning orientations interact and set the transformation

in motion. Of particular interest are the interactions between the less studied digital and learning orientations, e.g. how learning orientation moderates the cultural change process and (implicitly) contributes to (non-)financial outcomes. This also means conceptualizing new constructs and reconceptualizing the role of established constructs, such as learning-oriented values (Sinkula et al., 1997), in light of the framework. Such exemplary "how"-questions require considerable qualitative insight from in-depth case studies of servitizing organizations. On the other hand, the integration of additional constructs from outside the field (e.g. regarding digital orientation) may provide promising avenues for the application of probabilistic and configurational research on the causal strengths, pathways and necessary mechanisms that change toward service-driven business goals (Hair et al., 2019; Salonen et al., 2021b; Sukhov et al., 2023).

As noted above, servitization research is just beginning to take a fairly multilevel perspective (Lenka et al., 2018b; Struyf et al., 2021). While this research represents a preliminary attempt to study multilevel relationships, the authors are confident that an integrated view of the organizational and member level is central to future research on cultural change in servitization. Of particular interest are the interactions between members' behaviors, mental models and managerial interventions to overcome change resistance as underlying mechanisms of cultural emergence, e.g. how managers can create emergent situations for committed action to overcome the bounded rationality of product-oriented mental models (Weick, 2001). In this regard, member-level research can benefit from the introduction of underrepresented theories in servitization, such as social identity, self-categorization and role theory (Biddle, 1986; Stryker, 1980; Tajfel, 1974; Tajfel et al., 1971), to shed light on members' enactment of the transformation. In addition to case studies as an important tool for uncovering social mechanisms, this research encourages configurational research to reveal concrete pathways of member-level change to provide managers with a rationale for setting clear change agendas (Salonen et al., 2021a, b). Finally, while this paper focuses on social theorizing, individual psychological perspectives may also inform future research. According to Sagiv and Schwartz (2007), members introduce their own characteristics and values into the organization, which may influence members' sensemaking of the service-driven business transformation.

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3. The role of strategic and learning orientation in creating competitive advantage through digital service innovation

Abstract: Digital service innovation (DSI) plays a critical role for servitizing manufacturers to remain competitive in the digital era. This study proposes a novel framework that synthesizes recent advances in DSI, strategic orientations, and organizational learning. The framework identifies four cultural antecedents necessary for successful DSI: digital, service, innovation, and learning orientation. Emphasis is placed on a strong learning orientation as a dynamic capability to translate strategic digital, service, and innovation orientation into learning and innovation processes to create competitive advantage through DSI. The conceptual study encapsulates these dynamics in four empirically testable propositions and outlines approaches for multi-method testing to inform future research.

Keywords: Digital service innovation, Digital servitization, Strategic orientations, Learning culture, Dynamic capabilities, Competitive advantage

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3.1 Introduction

Increasing market and environmental uncertainty has prompted companies across industries to shift their strategic focus from maximizing profits to building resilience (Conz & Magnani, 2020). This shift has been exacerbated by the volatility of global events such as the COVID-19 pandemic (Conz et al., 2023). In response, manufacturers worldwide are increasingly adopting smart digital services to create resilient business models that cater to the needs of their customers (Li et al., 2022; Rapaccini et al., 2020). However, the phenomenon of digital servitization urges manufacturers to find innovative ways to apply digital technologies, such as IoT and artificial intelligence, to truly "smart" their digital services and create competitive advantage (Gebauer et al., 2020).

The capability to continuously renew competitive advantage through innovative resource configuration is at the very heart of resilient organizations (Teixeira & Werther, 2013). In this sense, competitive advantage is a function of how organizations approach and manage the innovation process rather than the innovation itself. Accordingly, the Oslo Manual finds resilient organizations establish cultures that inherently embrace innovation (OECD & Eurostat, 2018). Recent literature on organizational learning (Baker et al., 2022), new service development (Agarwal & Selen, 2015), and industrial servitization (Lin et al., 2019) supports the seminal role of cultural factors called strategic and learning orientation in providing direction and capacity for service innovation. Johansson et al. (2019) note that such "rules of the game" learned for product innovation differ from the innovation style required for services, leaving manufacturers struggling. Digitalization adds to this challenge as servitization scholars are just beginning to fairly develop a dedicated digital service innovation (DSI) perspective to explain manufacturers' competitive advantage in the digital era (Opazo-Basáez et al., 2022; Rabetino et al., 2023; Raddats et al., 2022). At the same time, literature from outside the field has begun to incorporate new strategic orientations that specifically address the changes brought about by technologies critical to DSI (Kindermann et al., 2021). Accordingly, the existing digital servitization literature fails to unpack the role of strategic and learning orientation and their translation into advantageous performance outcomes. This leaves managers without practical guidance for the change management of manufacturers seeking to create competitive advantage through DSI effectively.

To address the above gap, this research integrates recent advances in DSI, strategic orientations, and organizational learning into a cohesive framework. A promising way to integrate these interdisciplinary perspectives is offered by Baker et al.'s (2022) learning orientation model and two of the longstanding accounts of competitive advantage: the resource-based view (RBV) and dynamic capabilities (DC). This provides the theoretical foundation to model DSI and its conceptual link to advantageous servitization outcomes as a function of strategic and learning orientations that shape organizational behavior (Kozlenkova et al., 2014; Teece, 2007). Therefore, this research sets out to conduct a conceptual study to answer the questions: What are the cultural antecedents of DSI, and what antecedent conditions can create manufacturers' competitive advantage and thus foster resilience?

The article is organized as follows: Introduction, Section 2, presenting a brief literature review; Section 3, developing propositions collectively represented as a conceptual framework; Section 4, which discusses the contributions and limitations of this study, providing the basis for discussing future research opportunities and methods.

3.2 Theoretical background

3.2.1 Strategic and learning orientation to drive innovation capabilities

Working from the notion that "innovation capability is the lifeblood of organizational growth and performance", Baker et al. (2022, p. 864) model the impact of strategic and learning orientation on organizational performance by clarifying their nomological location within an organization's learning and innovation style to build innovation capabilities. These styles determine how organizations approach the innovation process and result in the successive dimensions of organizational learning outcomes, innovation objectives and innovation capabilities. Here, the quality of organizational learning outcomes aimed at closing performance-expectation gaps can be considered as the linchpin for organizations to build capabilities for more radical innovation activities and secondly as a function of their strategic and learning orientation (Baker et al., 2022; Baker & Sinkula, 2002). Strategic orientations reflect an organization's culture through more deliberate principles for guiding organizational learning toward competitive advantage (Zhou et al.,

2005). Complementary, learning orientation embodies cultural values that do not prescribe a strategic priority but rather how the organization uses information to operationalize strategic orientations (Baker et al., 2022; Baker & Sinkula, 1999).

3.2.2 Digital service innovation to drive manufacturer performance

With product sales proving less capable of absorbing the effects of market volatility, manufacturers are increasingly embracing digital servitization to maintain competitive advantage. The phenomenon involves utilizing digital means to implement innovative and value-creating service business models to drive financial and non-financial performance (Favoretto et al., 2022). To achieve the expected outcomes, digital servitization requires significant technology adoption capabilities compared to traditional service innovations such as contractual arrangements and product-service bundles. Accordingly, DSI emerges as a key driver, which describes "[t]he introduction of a new service associated with existing products or new products (...) built on digital elements that improve the operation of the product, or facilitate access to data in real time that allow improving the use of the product" (Opazo-Basáez et al., 2022, p. 101). In their definition, Opazo-Basáez et al. (2022) first recognize the inherent technological characteristics of DSI and subsequently situate the construct as part of technological innovation alongside the introduction of new products and production processes. As such, they distinguish DSI from non-technological organizational and marketing-related service innovations. A categorization of incremental (e.g., remote maintenance, customer apps), intermediate (e.g., process improvement), and radical (e.g., predictive maintenance, AI applications for asset management) DSI can be taken from Raddats et al. (2022). Second, Opazo-Basáez et al. (2022) show that DSI is particularly important for the performance of the machinery and computer industries, as a high prevalence of product-based customer interaction channels and extended product lifecycles allow for accessing, processing, and leveraging customer data to capitalize on DSI investments.

3.3 Conceptual framework development and results

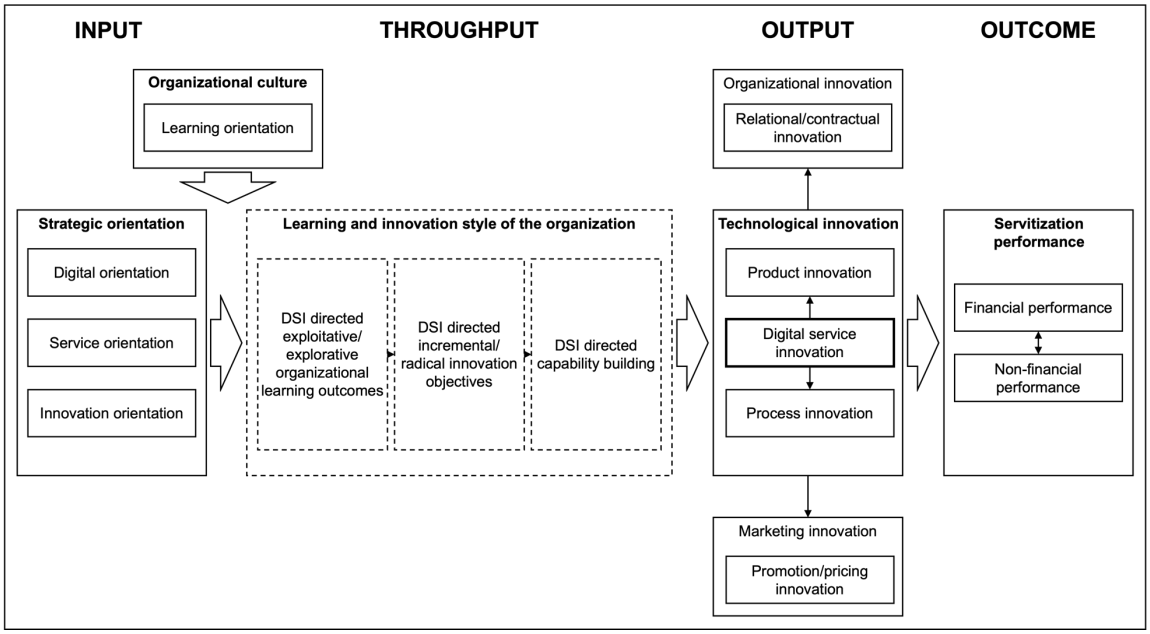
Regarding the above technological potentials, Johansson et al. (2019, p. 335) identify "[s]ensing and seizing opportunities for radical service innovation" as the dominant challenge for managers in servitizing organizations. This suggests that the relationship between DSI and creating advantageous servitization performance is more nuanced than

previously discussed in the literature. Specifically, this research proposes that the relationship between DSI and servitization performance depends on organizational learning processes driven by the organization's dynamic capability to rearrange and create resources for DSI effectively. Therefore, this conceptual study follows a three- step process for framework development:

- Interdisciplinary literature review of strategic orientations, guided by Rabetino et al.'s (2023) recent advances in DSI.
- Integration of the synthesized literature into Baker et al.'s (2022) learning orientation framework to anticipate organizational mechanisms.
- Reinterpretation through Teece's (2007) dynamic capabilities lens to model DSI and its link to servitization outcomes as a function of strategic and learning orientations.

Motivated by the learning model of Baker et al. (2022), the resulting framework depicted by Figure 1 includes five sets of factors: (1) the antecedent strategic orientations considered to promote DSI, (2) the learning orientation considered to moderate this relationship, (3) the contingent learning and innovation style of the organization, (4) the (technological) innovation output including the DSI construct, and (5) the consequent performance outcomes driven by DSI.

Figure 1: Conceptual framework



3.3.1 Cultural antecedents of digital service innovation

The RBV argues that organizational performance hinges on its resources and capabilities. Though resources encompass all tangible and intangible assets that enable an organization to implement its strategies, core capabilities that coordinate resources are defined by higher-level intangibles that drive advantageous organizational thinking to guide behavior (Zhou et al., 2005). While the RBV links intangible (knowledge) re- sources to advantageous performance, it neglects to explain how organizations maintain competitive advantage in a dynamic world. DC address this limitation by emphasizing the capabilities to sense, shape, and seize opportunities and sustain competitive ad- vantage through creating, expanding, and modifying the resource base (Teece, 2007). Echoing the above managerial challenge posed by Johansson et al. (2019), the focus is on developing more tangible capabilities that affect innovation type (i.e., incremental vs. radical) and organizational performance (Teece, 2007). As aptly summarized by Gnizy et al. (2014, p. 479): "DC are not specific capabilities such as manufacturing, marketing, supply chain, or R&D. Instead, they are agents of evaluation and change that permit firms to assess what changes to their resource and capabilities base is needed to remain competitive, particularly in the face of changing market environments".

Building on Baker et al. (2022), DSI occurs within the boundaries of an organization's learning and innovation style, which can be described as a function of strategic and learning orientation. Thereby, strategic orientations are behavioral reflections of an organization's cultural values regarding business conduct to inform and realign capabilities (Zhou et al., 2005). As such, they direct organizational learning, which refers to processes of changing organizational cognition and behavior to meet environmental requirements (Argote, 2011). This is essential to the innovation process, since organizational learning outcomes translate into innovation objectives that drive the capability development for specific innovation outputs (Baker et al., 2022). Following the comprehensive review of Rabetino et al. (2023), previous DSI literature emphasizes capabilities for digital services, digital innovation, and service innovation, at the intersection of the core concepts underlying DSI - *digital, service* and *innovation*. This research adopts this categorization and considers strategic orientations related to digital, service and innovation capabilities as antecedents of DSI.

Digital orientation. The digital dimension of DSI encompasses issues such as digital solution development, ecosystem orchestration, and digital exploration and value-capturing (Rabetino et al., 2023). In this regard, the concept of digital orientation appears to be critical (Kindermann et al., 2021): the strategic orientation directs organizational learning toward leveraging technologies for performance, cultivating competencies for digital value creation, integrating stakeholders in open ecosystems, and digital architecture configuration. This aligns with seminal literature linking strategic technology orientation to technological innovation (Zhou et al., 2005) and digital technologies to service innovation (Toivonen & Tuominen, 2009). Accordingly, digital orientation is suggested to support digital-related capabilities, e.g., for real-time customer data processing and product-service-software integration (Schroeder et al., 2020).

Service orientation. Rabetino et al. (2023) find the service dimension of DSI to consist of service (design of smart service systems, pricing, etc.) and customer-related topics (capture and use of customer insights). Two strategic orientations appear critical to address this dimension: Lin et al. (2019) show that service and customer orientation are essential strategic orientations to explain service innovation in manufacturing. Referring to measures to build organizational performance on service excellence and customer knowledge, these orientations are proposed to direct the learning style toward DSI by promoting service-dominant premises regarding service-based exchange and value co-creation. This is suggested to support service-related capabilities, e.g., for service concepts, processes, and customer experience innovation (Johansson et al., 2019).

Innovation orientation. The innovation dimension of DSI refers to issues of the innovation process, such as open and agile innovation, and technical and mindset-related aspects of the innovative application of ICT resources (Rabetino et al., 2023). Addressing this dimension appears to critically involve two strategic orientations: First, an innovation orientation that supports openness to generating new ideas and applying them to processes, products, and services to meet changing circumstances (Siguaw et al., 2006). Although conceptually adjacent, entrepreneurial orientation also merits consideration because it adds managerial risk-taking and proactiveness in seizing opportunities and has therefore been recognized as key to initiating radical innovation activities (Baker & Sinkula, 2009; Ettlie & Rosenthal, 2012). This is suggested to support innovation-related capabilities, e.g., for implementing agile structures to explore new ways of delivering value (Sklyar et al., 2019).

Considering the synergistic integration of complementary strategic orientations to drive advanced cultures for competitiveness (Hakala, 2011; Teece, 2007), this research proposes: **(P1)** Strategic orientations reflecting a digital, service and innovation-oriented culture are complementary dynamic capabilities for directing a manufacturer's learning and innovation style toward the development of digital service innovations.

According to the RBV logic, higher-level capabilities are most effective when embedded in a supporting system consisting of appropriate organizational structures, processes, and routines (Kozlenkova et al., 2014). This research focuses on learning orientation, which embodies the values of commitment to learning, open-mindedness, and shared vision that determine an organization's capacity to learn. A pronounced learning orientation supports anticipating change and unlearning outdated assumptions about markets, customers, and ecosystems that would otherwise hamper the organization's ability to adapt to and shape new circumstances (Baker et al., 2022; Day, 2011). This is associated with advanced exploratory learning outcomes and enables a learning and innovation style capable of driving both radical and incremental innovation. On the other hand, a weak learning orientation results in capabilities that support only incremental innovation because assumptions are rigid and insights are interpreted within their boundaries. In this way, learning orientation moderates the influence of digital, service, and innovation orientation, with this interaction setting the DSI process in motion, from organizational learning to capability development, innovation outputs, and performance outcomes.

Against the backdrop of innovation activities being at least partially mediated by organizational learning outcomes (Sinkula et al., 1997; Valencia, 2011), this research proposes: **(P2)** The impact of digital, service, and innovation orientation on digital service innovation outputs is mediated by the mode (i.e., incremental/radical) of an organization's learning and innovation style they motivate in interaction with the organization's learning orientation.

Considering this interaction's reflection of DC (Baker et al., 2022) and the consequent link of high learning orientation to innovation success and competitive advantage (Baker & Sinkula, 1999; Day, 2011; Wang, 2008), this research proposes: **(P3)** High learning orientation supporting a digital, service, and innovation orientation describes a manufacturer's dynamic capability for creating radical digital service innovations.

3.3.2 Consequences of digital service innovation

As argued in the previous section, decision-makers guided by digital, service, and innovation-oriented strategic thinking and operating in a learning-oriented culture are empowered to build DSI-directed capabilities that address environmental changes. DSI outputs then capture and reflect key decisions to create competitive advantage and drive consequences in the relevant innovation categories and their (non-)financial servitization performance outcomes (Favoretto et al., 2022; Johansson et al., 2019; Lin et al., 2019).

Technological and non-technological innovation. Drawing on the RBV-related integrative view, Opazo-Basáez et al. (2022) show that the three aspects of technological innovation, DSI, process and product innovation, are highly interrelated. Therefore, DSI is considered to improve process and product innovation outputs, e.g., through advanced insights to reconfigure logistics and meet customer needs (Raddats et al., 2022). Moreover, technological and non-technological innovations have been shown to rein- force each other (González-Blanco et al., 2019), so DSI is considered to enhance organizational and marketing-related innovations that are fundamental to financial and non-financial servitization performance.

Financial and non-financial servitization performance. The use of DSI in service offerings, ranging from basic product support to operating customer processes through product monitoring and control, enhances both manufacturer and customer value (Raddats et al., 2022). Yet, both manufacturer and customer value and the resulting performance outcomes depend on the radicality of the innovation (Johansson et al., 2019; Raddats et al., 2022). Financial and non-financial servitization performance are closely related, with financial improvements such as increased revenue explained by improved customer experience and cost reduction (Gebauer et al., 2020). To address the critical challenge of meeting sustainability goals, manufacturers can use digital platforms to monitor and optimize resource consumption (Schroeder et al., 2020).

Echoing long-standing accounts of industrial service innovation (de Brentani, 1989), servitization researchers urge the necessity for manufacturers to develop unique and radical innovations to transform the way they deliver value for competitive advantage (Baines & Lightfoot, 2014; Johansson et al., 2019; Raddats et al., 2022). Against this backdrop, this research proposes: **(P4)** Radical digital service innovation creates competitive advantage through transformative servitization performance outcomes.

3.4 Contributions and research opportunities

This research represents a conceptual study to advance the understanding of the role of strategic and learning orientation in DSI and to reveal its impact mechanisms in creating competitive advantage in manufacturing. To this end, this article makes theoretical and managerial contributions and opens opportunities for future research.

3.4.1 Theoretical contributions

This research makes two major theoretical contributions in line with the research questions. First, despite the considerable DSI knowledge base that has emerged, there is little research that can be applied to explain the required capabilities and consequent servitization outcomes through cultural antecedents, i.e., strategic and learning orientation (Lin et al., 2019; Rabetino et al., 2023). Given this drawback, this research echoes the recent call by Kohtamäki et al. (2019) to investigate the cultural aspects of digital servitization by synthesizing seminal literature on (digital) service innovation, strategic orientations, and organizational learning, and proposing four overarching antecedent dimensions – digital, service, innovation, and learning orientation – to address the requirements for successful DSI. In this regard, the research followed the recommendations of leading scholars in integrating interdisciplinary literature to address the multifaceted nature of DSI (Rabetino et al., 2023) and the underutilization of established theories in digital servitization (Kohtamäki et al., 2019; Rabetino et al., 2018).

The second contribution relates to integrating the synthesized literature with the learning orientation framework (Baker et al., 2022) and reinterpreting it through a RBV and DC lens (Kozlenkova et al., 2014; Teece, 2007). Consistent with influential accounts of innovation that characterize innovation as a mindset, a process, and an outcome (Kahn, 2018), the framework in Figure 1 shows culturally embedded strategic thinking to drive a manufacturer's learning and innovation processes that ultimately lead to DSI outputs and servitization performance outcomes. In doing so, the conceptualization of learning orientation as a moderator in the innovation process advances previous assumptions in servitization research (Lin et al., 2019), suggesting that culturally driven learning capabilities can significantly influence the relationship between strategic orientations and DSI (Baker et al., 2022). Here, the interplay of digital, service, and innovation orientations and a learning-oriented culture is argued to reflect an organization's dynamic capability to adapt to environmental changes through radical DSI successfully. This effectively

specifies the success factors for resilient organizations as identified by Teixeira & Werther (2013, p. 337), which encompass an open culture, strategic thinking beyond incremental innovation, and decision-makers who "create a culture that also expects (and therefore seeks) innovations that go beyond better to unique, making innovation a way of life (...) that starts with the strategic planning processes". This is expected to enable manufacturers to link environmental turbulence to creating DSI opportunities, turning sources of volatility into drivers of competitive advantage. Moreover, the RBV and DC provide a rational for sustaining such advantages. In addition to the potential synergistic effects, the proposed complementarity of intangible strategic orientations raises imitation barriers for competitors (Kozlenkova et al., 2014). Finally, the propositions and insights derived from the framework provide a novel perspective that considers the roots rather than the branches of manufacturers' approach to innovation, and thus the pressing issue of high DSI failure rates, e.g., in terms of IoT initiatives that fail to generate the expected financial servitization returns (Schroeder et al., 2020).

3.4.2 Managerial contributions

For managers, the proposed framework clarifies cultural design components of DSI to improve servitization performance and resilience responses. The first contribution stems from identifying the dimensions involved in the complex task of initiating, directing, and operationalizing capability building for DSI. By decomposing the DSI process, managers can use the framework to assess their organization's cultural readiness for DSI and derive interventions to adapt learning and innovation to environmental change. In this regard, managers should envision a digital, service, and innovation orientation in strategic planning and cultural change programs as they servitize their organization to strengthen resilience (Rapaccini et al., 2020; Teixeira & Werther, 2013). Moreover, such efforts should be embedded in fostering a learning-oriented culture that facilitates the use of digital means to target environmental change through industrial services. Second, the framework could convince decision-makers with a traditional manufacturing mindset that establishing a learning-oriented culture will help them integrate products, services, and software to achieve radical DSI outputs that not only incrementally improve servitization outcomes but create competitive advantage. Third, regarding contemporary challenges in resilience, managers should consider synergies between building cultures for DSI and achieving sustainability goals, as servitization is a promising lever for implementing sustainability strategies (Gladisch et al., 2023).

3.4.3 Research opportunities

The conceptual framework provides a theoretically anchored illustration of the role of strategic and learning orientation in creating competitive advantage through DSI. However, it is not intended to be exhaustive in detailing all the variables and theories that may be important in linking cultural antecedents and servitization performance. In this regard, the study invites further mid-range theorizing to narrow the propositions for empirical hypotheses testing. For example, in proposition 1, this research highlights the role of strategic orientations in directing the learning and innovation style toward DSI, but the precise way in which the identified dimensions influence DSI and servitization outcomes has yet to be explored. Drawing on theories from information systems and marketing (Rabetino et al., 2023), such as the social capital theory of innovation and the service dominant logic, could provide more detailed insights into the DC driving competitive advantage (Lin et al., 2019).

A second valuable use of the framework is to provide a depiction of where further variables may be located in relation to other aspects of the DSI process. This can help define adjacent categories of antecedent, process, or outcome variables. Moreover, the benefits of dynamic capabilities depend not only on the underlying organizational and managerial processes, but also on the context (Teece, 2007). Accordingly, identifying control variables will allow greater precision in isolating the effects of the variables of primary interest. For example, technological and market turbulence appear to be important in machinery and computer-based industries (Kohli & Jaworski, 1990).

Finally, this research invites multi-method research to address causal ambiguity, which refers to understanding how specific capabilities interact to produce the outcomes they do (Kozlenkova et al., 2014), e.g., what configurations of strategic orientations are most effective in specific contexts, what types of learning modes exist, and how can manufacturers implement high learning orientation. Along with in-depth qualitative research, configurational case studies may be a promising approach to disentangle causal paths for creating competitive advantage through DSI. Taking this further, established scales for strategic orientations (e.g., Lin et al., 2019), organizational learning (e.g., Zhou et al., 2005), innovation output (e.g., Raddats et al., 2022), and servitization performance (e.g., Favoretto et al., 2022) invite (combined) probabilistic and configurational research. This can provide a more complete understanding of causal ambiguity by revealing effect sizes

and complementary, necessary, and sufficient conditions for creating competitive advantage through DSI.

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4. Path towards servitization culture: Unveiling the organizational learning practices to support the cultural change from product manufacturing to independent service provision

Abstract: This single case study examines the cultural change during the 35+ years of an original equipment manufacturer's transformation into a leading independent service provider (ISP). Using an organizational learning framework, we unveil three major cultural shifts towards independent service, customer and entrepreneurial learning orientation that permeate the ISP culture. The continuous change process was supported by organizational learning practices to freeze the emerging ISP culture, rebalance the global ISP culture and unfreeze the ISP learning culture. The analysis details the process of removing cognitive and behavioral barriers to create a service-driven learning environment that connects learning loops across member, organizational and interorganizational levels. This article contributes to unfolding the lengthy and complex change processes in industrial servitization. Practitioners are provided with guidance to leverage residues of past learning and framing future learning processes to create a service-driven learning organization.

Keywords: Servitization, Third-party solutions, Organizational culture, Organizational learning, Continuous change management

Co-authors: This chapter was co-authored with Prof. Dr. Shaun West, Prof. Dr. Marko Kohtamäki and Prof. Dr. Karsten Hadwich

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4.1 Introduction

Manufacturers are increasingly transforming into industrial service providers. Servitization is a powerful engine for original equipment manufacturers (OEMs) to grow beyond their traditional product business (Rabetino et al., 2021; Raddats et al., 2019). Integrated repair, maintenance and life-cycle solutions, including independent services for third-party equipment, can improve financial performance, strategic differentiation and customer relationships (Neely, 2008). Reflecting the growing share of services in global GDP relative to manufacturing since the 1980s (*World Bank*, 2024), OEMs are increasingly competing on value delivered rather than product features, efficiency and scale (Bowen et al., 1989; Gomes et al., 2021). For OEMs, the shift toward service-based competition represents a foundational transformation of processes, capabilities and culture (Brax et al., 2021). As culture refers to an organization's learned way of external adaptation and internal integration, this transformation requires organizational learning, which refers to changing members' shared cognition and behavior through knowledge acquisition, distribution, integration and institutionalization (Flores et al., 2012; Schein & Schein, 2017; Wiewiora et al., 2019). Servitization culture often unfolds incrementally by learning from service operations, partnerships and customers, aligning with the continuous change model, where learning is endemic to operations (Kowalkowski et al., 2012; Martinez et al., 2010, 2017). Thus, organizational learning represents a promising perspective to understand how manufacturers can shape continuous change in such a way that the emergent culture holds multiple changes together, legitimizes nonconforming behaviors and embeds service-driven learning in values and norms to frame the transformation (Weick & Quinn, 1999).

Applying the organizational learning lens for cultural change in servitization requires an in-depth understanding of the interplay between context, content and process of change (Biesinger et al., 2024). Research has primarily focused on the content and context, addressing organizational learning outcomes and the circumstances of occurrence (Baines et al., 2017, 2020; Rabetino et al., 2018). Authors revealed the importance of developing and aligning service- and customer-oriented values, strategies and structures within manufacturers' internal and external context for servitization success (Brax et al., 2021; Dmitrijeva et al., 2020; Lexutt, 2020). Recently, scholars have emphasized the role of learning orientation in shaping servitization culture as an organizational learning process (Biesinger et al., 2024; Lin et al., 2019). At the same time, empirical insight into the

processes and practices that link member-level interactions to organizational learning outcomes remain limited (Kohtamäki et al., 2019, 2021; Lenka et al., 2018a, 2018b; Rabetino et al., 2017, 2018).

Prior studies have suggested that servitization research has developed based on descriptive case studies that are not theory-driven or theory-building (Rabetino et al., 2018). Considering the limited insight into servitization change processes, research would arguably benefit from in-depth, long-term studies employing process methodologies and sociopsychological theories (Kohtamäki et al., 2021; Martinez et al., 2017; Rabetino et al., 2017). In this vein, Biesinger et al. (2024) introduced multilevel theory, organizational learning and sensemaking to frame the service-driven change of manufacturing cultures, emphasizing practices to remove cognitive and behavioral barriers. The organizational learning literature posits that cognition guides behavior and behavior shapes cognition (Crossan et al., 1999), a principle we also apply in this study to unveil how manufacturers can tackle the challenge of "changing the mindsets of thousands of employees who have grown up with a narrow vision of products or services" (Davies et al., 2006).

The present study addresses the following questions: *How does servitization culture unfold and how can organizational learning practices support the change process?* Using 20 interviews, public and internal company data, this single case study examines the 35-years journey of an OEM to become a world-leading independent service provider (ISP). The study makes several contributions to the servitization literature. First, it develops a framework to model the path to servitization culture, using organizational learning to map the continuous interplay of change context, content and process throughout the OEM's servitization journey. Second, it identifies cultural shifts from product-based competition, technology push and analytical rigidity to independent service, customer and entrepreneurial learning orientation. Third, the study unveils the managerial practices that shaped the organizational learning process, addressing challenges from corporate restructuring, internationalization and post-merger integration. For practitioners, this study offers guidance for removing cognitive and behavioral barriers to servitization, leveraging residues of past learning and framing future learning processes to create a service-driven learning organization.

4.2 Theoretical background and framework

This section defines the core concept of servitization culture. Second, it introduces the organizational learning framework that defines the rationale and scope of this research.

4.2.1 Defining servitization culture

Servitization refers to the "shift from product-focused processes, organizational capabilities and culture to one that emphasizes services" (Brax et al., 2021, p. 518). Product and service organizations operate on a different logic, requiring manufacturers to change ingrained values, beliefs and behaviors (Vargo & Lusch, 2004, 2008). The product legacy focuses values on efficiency, scale and tangible features, often to the detriment of customer-centric and flexible approaches to service innovation (Bowen et al., 1989; Hartwig et al., 2021). Building on Schein & Schein (2017, p. 21), we refer to servitization culture as "the accumulated shared learning of [a manufacturer or business unit] as it solves its problems of external adaptation and internal integration [in growing the service business]; which has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, feel, and behave in relation to those problems". This accumulated shared learning embodies different orientations that permeate organizational values, strategies, structures and members' cognition and behavior (Biesinger et al., 2024). Service and customer orientation define the "savoir-être" and are prerequisites for realizing the (non-)financial benefits of servitization (Ambroise, Prim-Allaz, & Teyssier, 2018; Brax et al., 2021). Entrepreneurial and learning orientation are drivers to overcome inertia and foster openness to service innovation, customer co-creation and organizational agility (Lin et al., 2019; Sjödin et al., 2020; Tronvoll et al., 2020).

4.2.2 Introducing the organizational learning framework for cultural change in servitization

This research employs organizational learning to study cultural change in servitization as a "process of change in the cognition and actions of individuals and teams, embedded in and affected by the organization's institutions" (Wiewiora et al., 2019, p. 94). Following Baines et al. (2017, 2020), learning outcomes and processes are analyzed within Pettigrew's (1987) context, content, process framework. Table 1 presents selected findings on

these dimensions of cultural change in servitization and their implications for this research. Context shapes the interplay between content and process, further conceptualized below.

4.2.2.1 Content of cultural change in servitization

Cultural change in servitization involves transformational shifts in (1) organizational values, which guide (2) strategies and are operationalized in (3) structures (Biesinger et al., 2024; Tronvoll et al., 2020). As shown in Figure 1, the metaphor of single-loop learning aggregates processes that effect strategies and structures within prevailing values, such as market feedback and performance assessment. Double-loop learning visualizes value adjustments by challenging underlying beliefs in response to change's observed impacts (Argyris & Schön, 1996; Dauber et al., 2012).

Values are enduring beliefs about what is desirable, transcending situations to guide behavior and interpretations of events (Schwartz, 1992). Servitization values embody the deepest form of culturally encoded learning from pursuing service goals, legitimizing nonconforming decisions and behaviors within the product-driven culture as they emerge (Biesinger et al., 2024; Gebauer, Edvardsson, & Bjurko, 2010). In the context of intangible services and complex customer needs, these guiding principles are critical "to fill the gaps between what an organisation can train its employees to do and what the end customer expects" (Martinez et al., 2010, p. 462).

Strategy is pivotal to align external adaptation and internal integration of servitizing manufacturers (Alghisi & Saccani, 2015). Embedded value orientations direct the information sought and shared through vision, examples and incentives (Gatignon & Xuereb, 1997; Zhou et al., 2005). Kohtamäki et al. (2021) show that strategic narratives supporting transformational shifts shape the change process by influencing managerial sayings, doings and thus sensemaking of servitization across organizational levels. Recent research highlights learning strategies that foster entrepreneurial environments, reflecting the importance of members' autonomy to address the task uncertainty of the service business (Biesinger et al., 2024; Lin et al., 2019).

Biesinger et al. (2024) highlight the importance of structural configurations that operationalize service strategies from the top down while facilitating bottom-up learning processes to shape servitization culture. Decentralized and flexible decision-making structures are essential for creating processes and practices that adapt to task uncertainty and

Table 1: Key insights for cultural change in servitization and research implications

Change framework	Key concepts and insights for cultural change in servitization	Implications for this research
Context of change (What is the situation when change occurs?)	Servitization context	How does the context influence the cultural change across organizational learning processes?
	External context. Servitizing manufacturers adapt to market (customer requirements, regulations), ecosystem (collaboration, network competition) and technology changes.	
	Internal context. The internal integration of servitizing manufacturers is determined by their capabilities and maturity, including culture, leadership, power and politics, strategic and operational alignment and change acceptance (Dmitrijeva et al., 2020).	
Content of change (What changes?)	Servitization values	
	Service orientation. Managers and employees must strongly value services as the core of value creation and strategic differentiation to overcome resistance from the product culture and achieve financial and non-financial servitization performance in terms of high revenue, profitability, competitive advantage, customer satisfaction and loyalty (Brax et al., 2021; Gebauer, Edvardsson, & Bjurko, 2010; Lexutt, 2020).	
	Customer orientation. A strong orientation towards customer needs, value co-creation and customer satisfaction and relationship drives service innovation and performance (Gebauer et al., 2011; Lin et al., 2019).	
	Entrepreneurial and innovation orientation. Entrepreneurial mindsets encourage creativity, flexibility and risk-taking in solving customer problems, service innovation and promoting service growth within the prevailing product culture (Gebauer et al., 2011; Zighan & Abualqumboz, 2022).	
	Learning orientation. A strong learning orientation, which refers to a commitment to learning, shared vision and open-mindedness, reflects the ability to continually adapt to the changing context and translating emerging values and strategies into service innovation and performance outcomes (Biesinger et al., 2024; Lin et al., 2019).	
	Servitization strategies	Which orientations determine the changes in values, strategies and structures towards independent service provision? Do they emerge during the change process and how do they influence top-down and bottom-up processes of cultural change?
	Strategic alignment. Servitization strategies are key to aligning value and strategic orientations with the service portfolio, commitment to servitization and change readiness. They balance internal integration with adaptations to customers and the industrial ecosystem (Alghisi & Saccani, 2015).	
	Service and customer-oriented strategies. Strategies to align service vision, service capability investments, market offerings and customer satisfaction. They cultivate service and customer orientation by linking KPIs, human resources, training and customer insights to the change agenda (Abou-foul et al., 2021; Lexutt, 2020; Lin et al., 2019).	
	Service-driven M&A. M&A strategies aim to complement the service portfolio (Adding servitization), develop the target's services and leverage the merged entity's service portfolio (Utilizing servitization) or restructure the combined service portfolio to create new service offerings (Reconfiguring servitization) (Xing et al., 2017).	
	Servitization structures	
	Separated service unit. Separating the service and product business supports the cultivation of service orientation without radically changing prevailing values. While reducing clashes, separation can still threaten product units, fostering corporate change resistance (Gebauer et al., 2009; Gebauer & Fleisch, 2007; Gebauer & Kowalkowski, 2012).	
	Service-oriented structures. Service-oriented structures emphasize collaboration between product and service teams and customer partnerships. Mutual adjustment between service units and teams fosters innovation, enables customized solutions and promotes flexibility by integrating diverse skills to handle unpredictable tasks (Gebauer, Edvardsson, Gustafsson, et al., 2010; Gebauer & Kowalkowski, 2012; Kindström & Kowalkowski, 2014).	
	Customer-oriented structures. Customer-oriented structures describe the shift from basic services structured around product profit centers to global and regional customer-facing accounts, accessing resources from both service and product units to address customer needs (Gebauer, Edvardsson, Gustafsson, et al., 2010; Gebauer et al., 2009).	
	Learning-oriented structures. Low hierarchies and formalization foster experimentation and idea sharing, driving the emergence of a servitization culture. A wide span of control encourages skill diversity and autonomy, enabling service innovation and adaptation to customer needs (Biesinger et al., 2024; Lexutt, 2020; Tronvoll et al., 2020).	

Process of change (How does the change occur?)	Servitization change *Continuous change.* Change in servitization often unfolds as reactive, incremental responses to external adaptation and internal integration rather than following logical structures or planned strategies. Organizational maturity stages may punctuate this long-term process, including servitization exploration, engagement, expansion and exploitation (Baines et al., 2020; Kohtamäki et al., 2021; Kowalkowski et al., 2012; Martinez et al., 2017; Spring & Araujo, 2013). *Multilevel change.* Change in servitization emerges from the intra- and interorganizational interaction of constructs at the network, organizational and member levels (Lenka et al., 2018b; Struyf et al., 2021). *Change practices.* Change management must support members to overcome belief, information and belief barriers to servitization and support the bottom-up emergence of servitization culture (Biesinger et al., 2024).	What are the processes that drive the continuous emergence of servitization culture? Which practices support the cultural change?

customer needs (Lexutt, 2020; Tronvoll et al., 2020). Collaboration and communication between product, service and the customers' organizations enable learning from operations and validation of emergent cognition (Gebauer & Fleisch, 2007; Gebauer & Kowalkowski, 2012). Separate service units foster a learning environment to develop service-oriented values, strategies and practices that balance service exploration and exploitation while mitigating conflicts with product culture (Gebauer, Edvardsson, Gustafsson, et al., 2010; Gebauer & Fleisch, 2007).

Aligned with the findings in Table 1, servitizing manufacturers must realign values, strategies and structures toward service, customer, entrepreneurial and learning orientations:

(1) *Service orientation.* Understanding the organization as a provider of comprehensive solutions to customer needs beyond product features (Homburg et al., 2003).
(2) *Customer orientation.* High importance of customer relationships, knowledge and value in decision-making and behavior (Shah et al., 2006).
(3) *Entrepreneurial and learning orientation.* Commitment to continuous learning, shared vision, open-mindedness, creativity, risk-taking and flexibility (Biesinger et al., 2024).

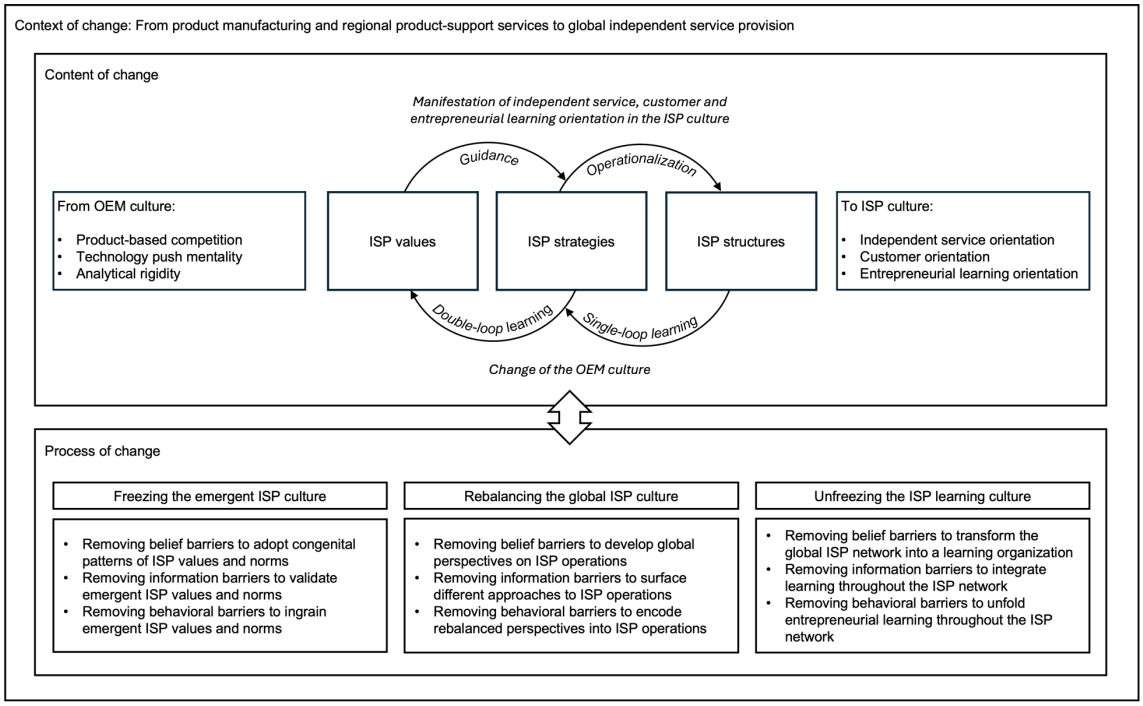
4.2.2.2 Process of cultural change in servitization

In line with servitization scholars, this research examines the change process through (1) organizational learning practices (Biesinger et al., 2024) driving (2) continuous change toward servitization culture (Baines et al., 2020; Martinez et al., 2017). Single- and double-loop learning unfold as organizations move from acquiring, distributing and interpreting knowledge to institutionalizing it by reshaping values, strategies and structures to create reliable responses to the change context (Dauber et al., 2012; Flores et al., 2012). The literature emphasizes learning from customers to address the co-creative nature of servitization and interorganizational learning in the internationalization of servitizing manufacturers, including mergers and acquisitions (M&A) (Öberg, 2023; Valtakoski, 2017; Xing et al., 2017).

Servitization creates tensions that may trigger resistance but can also catalyze cognitive and behavioral change (Lenka et al., 2018a, 2018b). Linking sociocognitive and organizational learning processes involves developing the "social architecture" to resolve conflicts and build a shared understanding of how to approach the changing context (Wiewiora et al., 2019). Therefore, manufacturers must remove (1) belief, (2) information

and (3) behavioral barriers to challenge the product culture and transform manufacturers into service-driven learning organizations (Biesinger et al., 2024). Following Baker & Sinkula (2002), this includes practices to surface and examine beliefs to justify new behaviors, second, validate them against current servitization cues, and third, provide the motivation, opportunity and ability to implement them. For example, behavior is unlikely to change unless the perceived benefits of service-oriented thinking outweigh the costs of change, supported by social structures, experiential insights and rewards (Gebauer & Fleisch, 2007; Zabala et al., 2022).

Figure 1: Synthesis of the context, content and process of cultural change



As shown in Table 1, organizational learning practices must support continuous change as servitization culture emerges from manufacturers' ongoing exploration of service-based competition in the aftermarket. Accordingly, planned change practices of unfreezing, moving and refreezing the organization are inappropriate to examine servitization (Wagstaff et al., 2021). Regarding continuous change intervention theory, "(…) the problem is not one of unfreezing. The problem is one of redirecting what is already under way" (Weick & Quinn, 1999, p. 379). Organizational learning in continuous change focuses on adapting to ongoing challenges and preventing inertia (Schein & Schein, 2017; Wolf et al., 2022). Though often small, incremental changes have a significant impact on culture as they accumulate in the long term: "(…) people tend to attribute the success of revolution to its break with the past and its vision of the future, whereas that success may

actually lie in its connection with the past and its retrospective rewriting of what earlier micro-changes meant" (Weick & Quinn, 1999, p. 379). Assuming the organization is continuously learning without clear starting and ending points, the change process is viewed as a sequence of *freezing, rebalancing and unfreezing* (Weick & Quinn, 1999):

(1) *Freezing.* Revealing incremental changes and emerging patterns of thought and behavior to develop organizational behaviors for approaching the service business.
(2) *Rebalancing.* Reinterpreting and rearranging transformation patterns to reduce blockages as they unfold through appreciative inquiry.
(3) *Unfreezing.* Resume exploration, learning and goal-setting through mindful and flexible practices that are more resilient to the challenges of servitization.

4.3 Research methodology

4.3.1 Research setting and design

Following Kozlowski et al.'s (2013) design principles for research on emergent phenomena, we treat cultural change as multilevel, beginning with the cognition and interaction of members and culminating in a collective property. Second, process orientation emphasizes the dynamic interactions that drive and shape the emergence of culture. Third, cultural change is temporally sensitive as the "manifestation of the collective property takes time, entailing developmental and episodic changes" (Kozlowski et al., 2013, p. 591).

Survey-based servitization research has failed to capture culture's process-oriented and temporal dynamics (Gebauer, Edvardsson, & Bjurko, 2010; Rabetino et al., 2018). On the other hand, informants often cannot fully articulate complex processes. Case research provides the observational flexibility to infer the emergent processes of cultural change through retrospective interviews (Kozlowski et al., 2013) and to establish a more comprehensive and trustworthy analysis through triangulation of data and methods (Perry, 1998; Yin, 2018). We employed an abductive research approach for an in-depth, long-term single-case research (Dubois & Gadde, 2002; Yin, 2018) to elaborate on cultural change theory in servitization (Lindgreen, Di Benedetto, Thornton, et al., 2021).

In our theory elaboration, we refer to Biesinger et al.'s (2024) organizational learning model to identify inflection points in the continuous change process of the case company (George & Bennett, 2005). We then advance the received framework by systematically

confronting it with the empirical findings and further theory (Guenzi & Storbacka, 2015). The single-case design fits our abductive approach of "moving back and forth between frameworks, data sources, and analysis" (Dubois & Gadde, 2002, p. 555) and seeking a thorough understanding of change processes, rather than explaining variance (Kozlowski et al., 2013; Langley, 1999). Following Yin's (2018) sampling criteria, we identified a critical case company that demonstrated a shift to high servitization maturity in terms of "extensive service portfolio, high service turnover, separate service organization, high managerial service orientation" (Brax et al., 2021, p. 537). The case offers revelatory potential by detailing internal and external service growth through M&A (Salonen & Jaakkola, 2015; Xing et al., 2017), developmental and episodic changes over time (Kozlowski et al., 2013).

4.3.2 Data collection

Following an indirect qualitative approach to infer cultural change, we use multiple data sources to develop an interpretive account of the emergence and impact of the servitization culture (Kozlowski et al., 2013). The core of the empirical data collection is interviews with key actors from different episodes of the case company's servitization journey (see Table 2). We also collected secondary data based on annual reports, investor information, M&A documentation, historical books, press releases and web resources. The triangulation of data from various sources enabled us to identify novel perspectives (Dubois & Gadde, 2002) and increased the validity of the qualitative research process (Gioia et al., 2013; Lindgreen, Di Benedetto, Thornton, et al., 2021). The interviews were conducted primarily in 2024 and focused on describing the context, content and process of the case company's cultural change toward independent service provision. To mitigate inaccurate recall and post-rationalization, we conducted interviews with key informants using multiple interviewers and at different points in time (Voss et al., 2002). The semi-structured interview guide was informed by the Biesinger et al. (2024) framework to include the conceptual key building blocks of cultural change in servitization. Using purposive sampling, we selected representatives based on their experience with servitization and its management, both within the focal company and at acquired service providers (Yin, 2018). Interviewees held positions from "Manager" and "Head of" to "Division President", and ranged in tenure from 1 to 40 years, allowing us to capture the transformation from a cultural and strategic perspective at different points in time.

Table 2: List of interviews

ID	Episodes	Positions in the company	Total years in the company (incl. acquisitions)	Regions	Duration of the interviews (min)
1	1, 2, 3	Corporate leadership, division president, director of subsidiaries	29	1, 2, 3	63, 78 and 75
2	2, 3	Division director and regional subsidiaries	8	1, 2	74
3	2, 3, 4	Vice president of service engineering, regional head	20	3	56
4	3	Head of global project management	2	1, 2, 3	60
5	2, 3	Regional president, President of subsidiary	8	1, 2, 3	56
6	1, 2, 3, 4	Regional president	27	2	58
7	1, 2, 3, 4	Global and regional service sales manager	40	1, 2, 3	106
8	1, 2, 3, 4	Service manager	22	1, 2, 3	45
9	2, 3, 4	General manager of regional turbo services	13	1	59
10	1, 3	General service sales and marketing manager	9	2	121
11	2, 3, 4	President regional service division, regional vice president of pumps aftermarket	15	1	60
12	3	Head of service sales and engineering	1	1, 2, 3	50
13	2, 3	Sales manager in turbo services	4	1	42
14	1, 2, 3, 4	Corporate leadership, Division president, regional head of service operations, regional managing director	26	1, 2, 3	59
15	1, 2, 3, 4	President of regional service division, field services manager	30	3	113
16	2, 3, 4	Regional managing director of service division, service operations director, head of service business development	20	1	62
17	3, 4	Regional legal counsel of service division	10	2	55
18	2, 3, 4	Head of service business development and strategy, global product manager	11	1, 2, 3	80

Legend
Episodes: 1 = OEM Days, 2 = Turbo ISP Days, 3 = Driver-Driven Days, 4 = Services Days
Regions: 1 = EMEA, 2 = APAC, 3 = Americas

4.3.3 Data analysis

Building on Kozlowski et al. (2013), we examined the case over time (temporal perspective), considering that cultural properties emerge temporally from the member level and manifest as organizational phenomena (process and multilevel perspective). The analysis followed a three-step process. First, we synthesized the secondary database and initial interviews with a central actor of the transformation to write a detailed case description, sequencing the critical events of external adaptation and internal integration. The integrated approach follows Schein & Schein's (2017) method to begin cultural research with a historical analysis of learning outcomes and their occurrence in time as well as Epstein's (1999, p.42) principle that “if you haven’t grown it, you haven’t explained its emergence.”

Table 3: Trustworthiness of the study

Criteria	Measures taken to operationalize criteria	References
Pre-understanding of the empirical phenomenon *Extent to which the researchers were familiar with the empirical phenomenon*	• *Industry expertise.* Three members of the research team have 20+ years of research, consulting and teaching experience in the servitization of machine manufacturing companies. One researcher has 5+ years of experience. • *Research expertise.* The authors represent schools relevant to servitization, including marketing management, service engineering and service business development, with publications in relevant journals and conferences. • *Sensitizing interviews.* Initial interviews to inform the study design. • *Literature review.* The authors conducted an extensive literature review.	(Guenzi & Storbacka, 2015; Kowalkowski et al., 2017)
Credibility (internal validity) *Extent to which the results appear to be acceptable representation of the data*	• *Cross-functional interviews.* Inclusion of participants from various levels and functions of the case company to minimize subjective biases. • *Interview focus:* Interviews specifically examined cultural change and organizational learning practices. • *Confirmation with key informant.* Validation of key events and processes. • *Systematic data structure.* Application of the Gioia method for consistent coding and structure mapping. • *Participant-contributed documents.* Participants supplied documents (e.g., assessment tool to align values and structures across regions and units). • *Triangulation.* Continuous combination multiple data sources • *Cross-referencing with external data.* Contextualized findings through annual reports, investor information, M&A records, historical documents, web resources, and databases such as the KLeuven Business Library.	(Bowen, 2008; Dubois & Gadde, 2002; Gioia et al., 2013)
Transferability (external validity) *Extent to which the findings can be applied to other contexts*	• *Sampling rationale.* Clear rational for case and interviewee selection to appreciate the researchers' sampling choices. • *Guiding framework*. Analysis follows an established framework for cultural change in servitization that supports structured and generalizable insights. • *Contextual richness.* The case is embedded in a detailed historical narrative, enhancing its relevance to comparable industries and time periods.	(Dubois & Gibbert, 2010; Lindgreen, Di Benedetto, & Beverland, 2021; Yin, 2018)
Dependability (reliability, auditability) *Extent to which there is consistency of explanations*	• *Data management.* A case study database in MAXQDA was established to systematically organize and analyze data, supporting consistency in analysis. • *Theory-driven interviews.* A theory-driven interview guideline ensured coverage of key change concepts across interviews. • *Theory-driven analysis.* Findings were justified using established concepts and theories from the literature on cultural change in servitization. • *Transparent argumentation.* A clear chain of evidence is maintained with rich informant quotes, ensuring traceability throughout the data structure.	(Dubois & Gadde, 2002; Lindgreen, Di Benedetto, & Beverland, 2021)
Conformability (objectivity) *Extent to which researchers' biases were avoided*	• *Collaborative analysis.* Multiple team members contributed to the interpretation of findings to reduce researcher bias.	(Pratt, 2009)
Integrity *Extent to which interpretations are influenced by misinformation from participants*	• *Professional relationship.* One researcher maintained a professional relationship with the case company, providing deeper organizational insight. • *Personal narratives.* Interviews centered on individual stories to reduce generalized or biased responses.	(Guenzi & Storbacka, 2015; Kozlowski et al., 2013)

Second, we coded the interview data using MAXQDA based on first-order categories (observations and quotations), during which we began to form second-order themes under third-order themes (Gioia et al., 2013). In line with the theoretical framework, we correlated third-order themes with shifts in change content related to values, strategies and structures. From a processual perspective, we analyzed continuous change as third-order interventions, driven by second-order organizational learning practices. Following the theory elaboration approach, the concepts guided the analysis, while allowing flexibility in identifying the underlying first-, second- and third-order themes (Lindgreen, Di Benedetto, Thornton, et al., 2021). The semi-deductive data structure was designed to explain the relationship between data and findings and did not limit the researchers' ability to creatively interpret the interviews (Langley, 1999).

Third, we integrated the coding structure with the case timeline to analyze the content and process of cultural change. In doing so, we sought to gain a contextualized understanding of cultural change as a "whole and keep an eye on the parts'' (Klein & Kozlowski, 2000, p. 54). We synthesized interview codes, secondary data and insights gleaned from ongoing exposure to literature in a nonlinear, time-aware and path-dependent manner (Guenzi & Storbacka, 2015). By treating cultural change as a subjective perception, we acknowledge the interpretivist view that some of the reported phenomena are not amenable to validation but can be understood in an interesting and meaningful way (Robertson & Swan, 2003). The trustworthiness of our research is supported by strong links to theory and a clear chain of evidence illustrated by a rich set of quotations (Yin, 2018). Table 3 provides a formal assessment of trustworthiness, including the design tests recommended for case studies in industrial marketing management research (Guenzi & Storbacka, 2015; Lindgreen, Di Benedetto, & Beverland, 2021).

4.4 Findings

We begin the discussion of the findings by presenting the case company's servitization journey (see Figure 2). Second, the four episodes of this journey frame the analysis of the cultural shifts from product manufacturing to the provision of independent services from the 1980s until 2022. In line with the theoretical framework, these shifts are described based on servitization values, strategies and structures. Third, the continuous change process is analyzed through organizational learning practices to freeze, rebalance and unfreeze change, shaping cultural shifts and vice versa. Following the abductive research

approach, literature-based reflections and informant quotes are used to illustrate the first-order themes presented in Figures 3 and 4.

4.4.1 Case context of cultural change and key servitization events

The study focuses on the servitization of a company that has traditionally operated in machine manufacturing. The publicly traded company operates two manufacturing divisions and a service division, which provides OEM and non-OEM services. According to the 2023 report, the company's revenue was approx. 3.3 billion Swiss francs, with EBIT of 329.7 million Swiss francs. Services accounted for more than 35% of order intake. The global manufacturing and service network includes more than 180 production and service sites in over 40 countries. Over the past three decades, the company has significantly expanded its independent service business, which provides repair, maintenance and advanced services for rotating equipment, turbines, compressors, generators and pumps. The servitization journey culminated in the creation of the Services Division with the goal of "becoming a one-stop service supplier (…) establishing service centers [to] repair a range of different products under one roof" and to "combine the advantage of a global company with the flexibility of a local partner" (Annual Report, 2016). We aimed to analyze interviews and secondary data to map the progression of servitization at an appropriate level of abstraction. Motivated by Baines et al.'s (2020) business progression model, we identified four episodes: OEM Days, Turbo ISP Days, Driver-Driven Days and Services Days. These episodes provide the context for cultural change. Figure 2 illustrates the episodes and key events of servitization.

4.4.2 Content of cultural change toward the provision of independent services

The Turbomachinery Services Division and its organizational successors underwent an organizational learning process to accommodate the changing context by shifting its culture to independent service provision. As shown in Figure 3, the ISP culture reflects independent service-, customer- and entrepreneurial learning-oriented changes, in contrast to the OEM's origins of product-based competition, technology push and analytical rigidity.

4.4.2.1 From product-based competition to independent service orientation

The shift to an independent service orientation required changes in values, strategies and structures, redefining the core business to providing total customer solutions beyond the installed base and challenging OEMs in servicing their equipment.

Independent service-oriented values

Following the divesture of the OEM business, the division adapted independent service-oriented values to redefine its core business. Influenced by the cultural legacy of its first service-driven acquisition (see Figure 2), it embraced the uncertainty of the service market to challenge risk-averse and expensive OEMs with flexible, customized third-party solutions. The shift was rooted in beliefs that *"the philosophy of services is to bring value to customer"* and that solutions require *"(...) to go beyond the fleet-specific service of OEMs and accepting all brands on customer sites" (ID 7)*. The division shifted from viewing services as a *"necessary evil" (ID 18)* to support products and recover profits to embracing them as the core of values creation and strategic importance to generate higher profits (Gebauer, Edvardsson, & Bjurko, 2010). Driven by growth expectations in the ISP market, this commitment to services legitimized strategic and structural changes to improve service innovation (cf. Alghisi & Saccani, 2015; Baines et al., 2020):

> *"For OEMs, service is a risk, people can put parts together wrong. As a third party, we don't have to follow OEMs restrictions on how to handle parts, we can be innovative and do the work they won't touch. It's our response to the customer, the quality of our solutions and price. We knew the opportunities were out there. We had to do some R&D and build the processes, procedures and techniques to compete on services" (ID 15).*

Independent service-oriented strategies

Independent service-oriented strategies focused on streamlining core competencies for service delivery times and effectiveness, while building and acquiring service centers in areas with broad geographic reach (see Annual Reports 2003-2009). For example, by transferring ISP knowledge, culture and technology to a corporate start-up in Indonesia, the division centralized repair operations for the APAC region. In the Driver-Driven Days, the division focused on diversifying and integrating the corporation's service ca-

pabilities for turbomachinery and pumps (see Annual Reports 2010-2021). Diversification was supported by acquisitions such as Dowding & Mills, which extended auxiliary equipment capabilities and reconfigured the division's total solution offerings:

> *"Our strategy was to walk, run and jump. Walk was operational excellence, providing excellent service and making it profitable. Second, growing the business organically, doing start-ups and new service lines. Finally, growing externally, getting to the level of excellence where you can buy a service company and make it better" (ID 1).*

Independent service-oriented structures

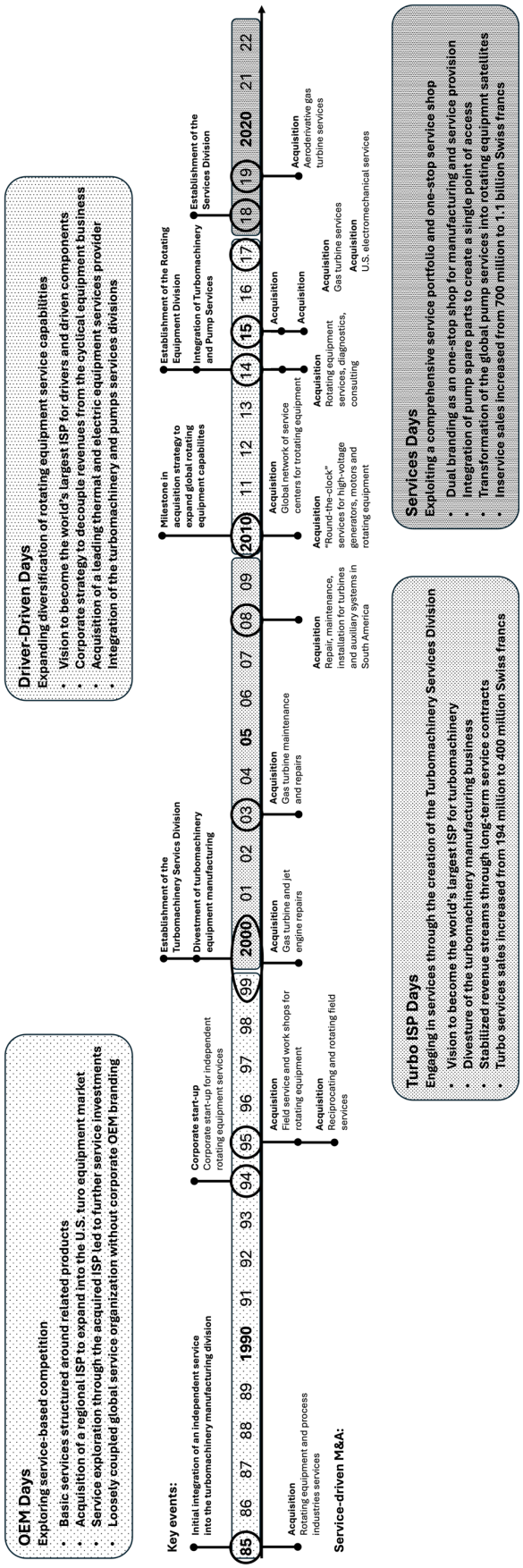
The development of independent service-oriented structures supported the cultural shift, operationalizing the emerging values and strategies. The separation of the turbomachinery service business and the subsequent integration of pumps services during the Driver-Driven Days fostered a learning environment to align former product-support functions with service goals and the demands of the ISP market (cf. Gebauer & Fleisch, 2007; Lexutt, 2020):

> *"We get more work and money out of the OEM service centers than they ever did because we put it in the right environment to develop it according to the market needs" (ID 1).*

Structural change involved developing service processes, procedures and information systems to operationalize the independent service strategy. An important part of shifting towards independent service orientation was the standardization and formalization of modular service offerings. In line with Hakanen et al. (2017), modularity provided members with a coherent framework to approach the service market across global service centers. Developing a service-oriented ERP system supported the management of modular service projects, connecting members on a platform to share knowledge and collaborate effectively:

> *"To scale this industrial service philosophy across a complex group, we looked at standardizing the service offering and how our businesses go to market. We designed the ERP system for pure service work to be accessed globally, to build projects from existing knowledge and to bring the entire organization together on the platform. Creating this cultural basis made change easier as we could move people around in the division" (ID 5).*

Figure 2: Case context, episodes and key events of servitization



4.4.2.2 From technology push to customer orientation

The shift to a customer orientation required changes in values, strategies and structures, redefining value creation to meet the complex needs of industrial service customers.

Customer-oriented values

The shift from the traditional technology-push mentality to customer orientation was rooted in Turbo ISP Days' leadership philosophy of adopting customers' risk and revenue models in decision-making, resonated by the beliefs that *"the customer is the only reason you exist" (ID 9)* and "*understanding as a customer is a journey of going through the good the bad and the ugly with them (...)" (ID 8).* Long-term customer relationships are recognized as central to competing in the ISP market (Gebauer et al., 2011), co-creating customer value and overcoming trust issues as a third-party service provider (Pathak et al., 2022):

> *"We had to find ways to work through the customers issues with them to get them excited to work with us and to recognize our value. We wanted to become their preferred service provider, especially as a third-party, we had to beat the OEMs" (ID 1).*

Customer-oriented strategy

The division pursued a customer-oriented strategy to align services, geographic presence and spare parts production with customer needs rather than new product sales. During the Turbo ISP Days, the division used acquisitions to improve customer proximity through basic repair shops in emerging markets and central repair hubs in the core EMEA market. This strategy was enhanced during in the Driver-Driven Days by integrating more than 100 regional pump service shops to create a single customer access point for rotating equipment, strengthening customer relationships and cross-sales:

> *"We started the one-stop-shop strategy to make the turbo and pump service organizations work closer together, using the integrated local pump shops and the sales organization. They had regional shops and salespeople who were close to the customers. Relationships with electrical and oil & gas companies working with turbines were already in place" (ID 7).*

Customer-oriented structures

Customer-oriented changes manifested in local customer proximity to ensure responsive service and managerial customer proximity to build customer learning relationships and strategic adaptation based on customer insights (Hakanen et al., 2017; Thornton et al., 2015):

> *"It was important to have only a few layers between the customer and top management of the service organization. Without this proximity to the frontline and customer interactions there was a danger that the company would continue to follow traditional paths" (ID 2).*

During the Driver-Driven Days, the division operationalized its customer-oriented strategy to become a one-stop shop by decoupling spare parts from new equipment lines and establishing regional parts manufacturing facilities to ensure timely, customized supply to each customer base. Second, the global turbomachinery and pump service network was integrated into a satellite structure to meet local customer needs of varying technological complexity. Local shops were equipped to service less complex rotating technologies. Major overhauls and complex equipment were redirected from these satellites to centralized repair hubs in EMEA, APAC and the Americas:

> *"One of the OEM-driven pitfalls was that component requests were placed on the manufacturing facility's production list, causing customers to wait months for a repair that could take weeks or days. Now, the satellite shops supply them with parts and do small repairs in local facilities. Complicated repairs go to the regional main hub." (ID 2).*

4.4.2.3 From analytical rigidity to entrepreneurial learning orientation

The shift to an entrepreneurial learning orientation required changes in values, strategies and structures, providing the capacity to challenge the OEM culture and transform the division into a service-driven learning organization.

Entrepreneurial learning-oriented values

Rooted in the ISP philosophy of the OEM Days' service organization to develop solutions beyond industry conventions, the division's entrepreneurial learning orientation drove the internal change to capitalize on a disrupted services market (cf. Biesinger et al., 2024):

"OEMs considered to own the service and parts business. When the third-parties started stepping in, it was one of these change moments in an industry where you either accept the change and find a way to survive in it or get shoved to the wayside. So that's the adaptability and creativity; entrepreneurship will probably win" (ID 1).

Proactive service business development was inseparable from developing the cultural capacity to overcome the OEM's analytical rigidity, shifting from incremental manufactur-

Figure 3: Data structure of the change content

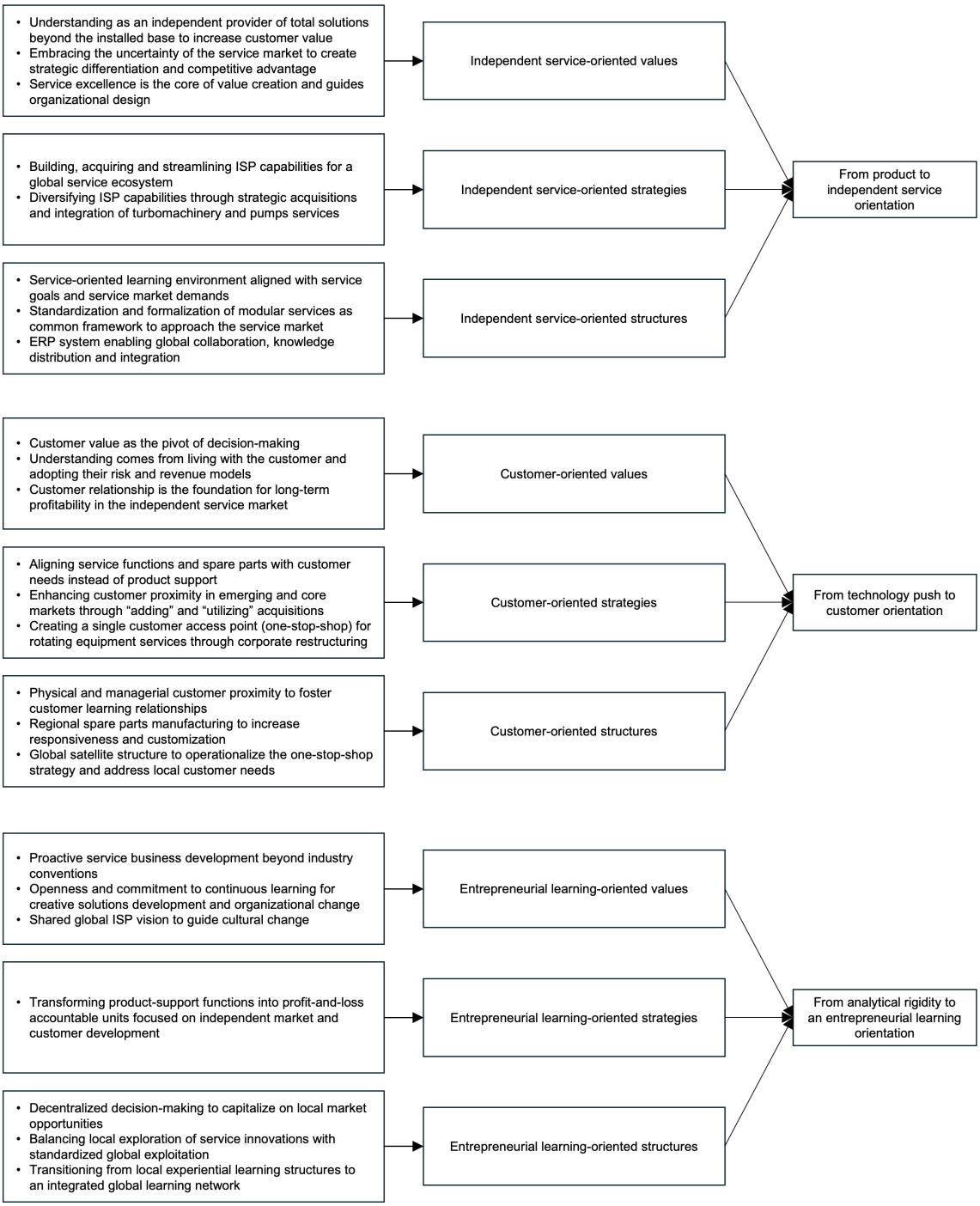
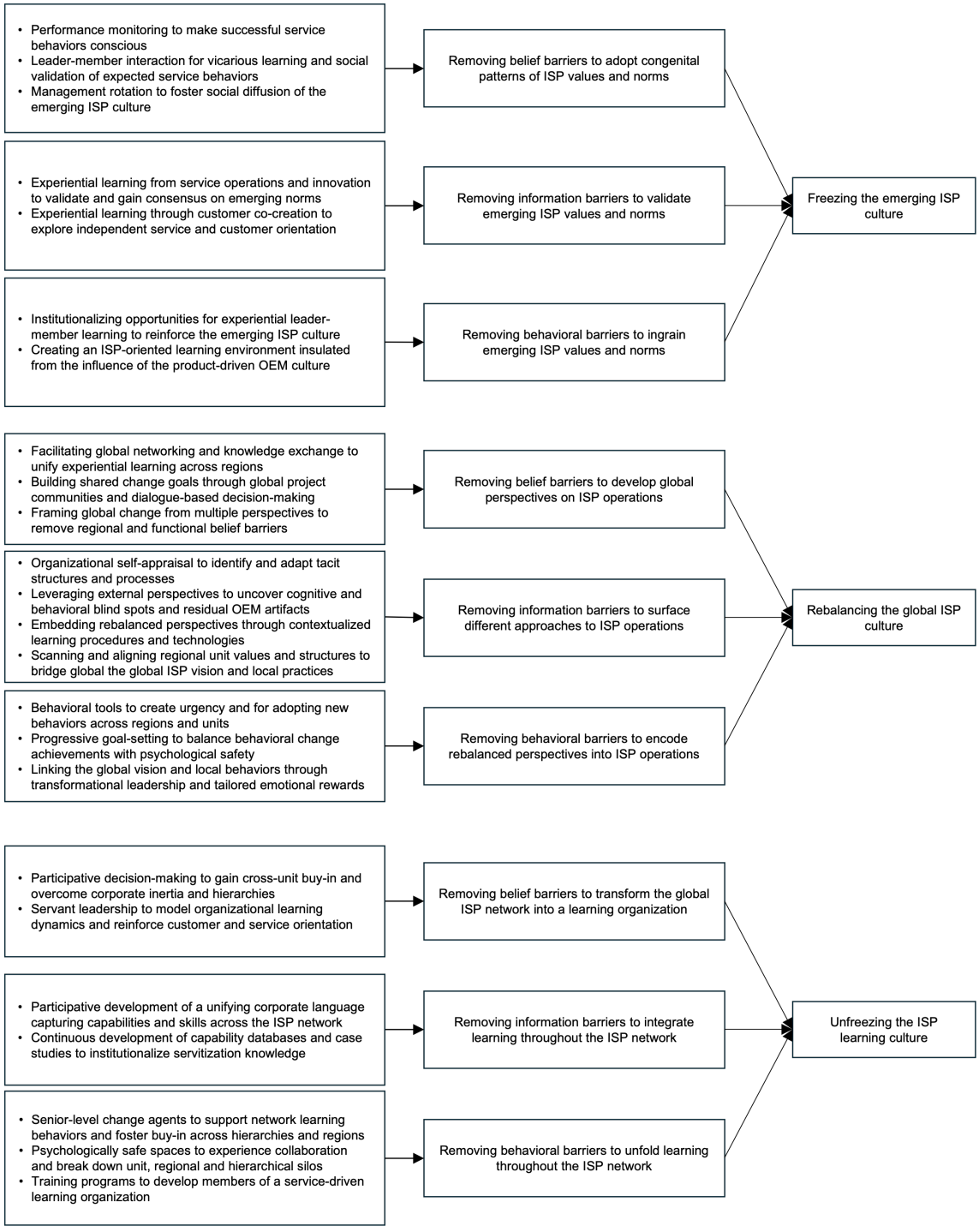


Figure 4: Data structure of the change process



ing improvement to a dynamic, experiential learning approach based on openness and commitment to continuous learning (Baker et al., 2022; Flores et al., 2012). In line with Sinkula et al. (1997), changing the way of using information was fueled by *"values around always challenging the status quo"* and directed by the *"persistence to follow the global [ISP] vision" (ID 5):*

"We came from a very analytical environment. Set processes, following a set kind of regime with only small changes here and there when necessary. Service is a creative environment, especially when you service different OEMs. The change was about learning to find creative solutions to satisfy the market and different customer needs. You can't come up with a manufacturing approach of a complete repair set for a specific kind of failure" (ID 2).

Entrepreneurial learning-oriented strategy

An entrepreneurial learning strategy guided the transformation of the former product-support functions integrated during the Driver-Driven Days into adaptable, independent service business units. The aim was to embed awareness, capability and responsibility for market and customer development to ensure profitability beyond OEM parts sales:

"The pump shops were run as funnels to sell OEM parts, not to provide service and help customers. We wanted them to increase their entrepreneurial focus and pursue non-OEM products, making them profitable service centers, selling parts and doing service" (ID 1).

Entrepreneurial learning structures

Entrepreneurial learning structures operationalized the changing mindset through fostering decentralization, as *"service is a local business, impossible to control from a central organization"*. Autonomous decision-making was important to transform the satellite service shops from mere OEM parts distributors to local market shapers, emphasizing the role of service center managers with an *"entrepreneurial, MD-like outlook, much more rounded than in new equipment" (ID 11).* Against this background, ambidextrous learning from multiple local learning sources has been crucial throughout the division's change process (cf. Brix, 2019). Its growth relied on balancing decentralized exploration with global standardization of service-driven behaviors, enabling creative problem-solving to innovate service capabilities and portfolios while ensuring the exploitation of standardized approaches to exploit the ISP market:

"The success of change was about building global competencies and defining how things are done most of the time. However, creative engineers will challenge those standards, and creative ideas will make money because their solution is cheaper, faster

or downright better. So, we constantly had to balance building the basics and being creative" (ID 4).

As the transformation expanded during the Driver-Driven Days, the division moved from the more local experiential learning style to a global network approach to facilitate systematic knowledge sharing across units and members (cf. Brix, 2019; Calantone et al., 2002):

"*The network was pretty knit. We knew exactly who to go to for specific knowledge. Having a vast and well networked knowledge base was key to the service organization. If they lacked knowledge to address a customer need in one region, we wanted them to be able to quickly fall back on others within the network" (ID 2).*

4.4.3 Process of cultural change toward the provision of independent services

Studying the division's change process through the organizational learning lens revealed practices to support the cultural shifts identified in section 4.2: freezing the emerging ISP culture, rebalancing the global ISP culture and unfreezing the ISP learning culture. As shown in Figure 4, the practices demonstrate how the division cultivated learning from external adaptation and internal integration by removing belief, information and behavioral barriers to servitization (Baker & Sinkula, 2002; Schein & Schein, 2017).

4.4.3.1 Freezing the emerging ISP culture

Freezing the emerging ISP culture required removing (1) belief barriers to adopting congenital patterns of ISP values and norms, (2) information barriers to validating emergent ISP values and norms and (3) behavioral barriers to ingraining them.

Removing belief barriers to adopt congenital patterns of ISP values and norms

In the nascent division, change unfolded through removing belief barriers to congenital learning, shaped by the values and behaviors of the OEM Days' service organization (Huber, 1991). Consistent with Schein & Schein (2017), the cultural legacy traces back to the first acquisition of an ISP and its founder's philosophy of entrepreneurship and customer orientation to overcome the pitfalls of OEM services, which imbued the leadership team that took over after the division's creation. Performance monitoring of the independent service business as *"the most profitable leg in turbo machinery" (ID 1)* made the success formulas of the service-minded members conscious, opening the

emerging ISP culture to reinforcement (Baker & Sinkula, 2002; Huber, 1991). During the Turbo ISP Days, members internalized this cultural imprint by observing leaders who "*walked the talk to show how to solve problems" (ID 10)*, vicariously learning the expected behaviors to achieve service-driven goals (Ostroff et al., 2012). Interactions with service leaders, feedback and a shared language played a key role in socially validating the emerging independent service, customer and entrepreneurial learning orientation (Schein & Schein, 2017):

> *"Going back 20 years ago, I remember we had an unwritten set of rules: Make sure it's right [service quality], make sure it's on time [customer needs], make sure we make money [entrepreneurial outlook]. We spent a lot of time managing work by walking around in the shops and it might sound cliché, but you always heard the managers say that" (ID 3).*

Management rotation supported the social validation and diffusion of the emerging ISP culture by cultivating a comprehensive understanding of the independent service business from diverse professional perspectives (Baker & Sinkula, 2002):

> *"Spreading the culture was into sharing common goals, educating the management team into understanding all areas of the independent service business. We all spent time in operations, sales, business development to ensure the management understands what it takes to run the service business, its life cycle and philosophy" (ID 3).*

Removing information barriers to validate emergent ISP values and norms

Removing information barriers shifted learning from congenital to experiential (Ostroff et al., 2012). Consistent with Schein & Schein (2017), consensus on values through social validation is not automatic. Members had to empirically test the reliability of emerging values as the nascent ISP *"had to come up with own answers to customers' problems and develop procedures that were agnostic to the manufacturer" (ID 3).* Values around independent services, customers and entrepreneurial learning have been reinforced through experiential learning from service operations that guided the division's structural design by standardizing successful practices and thus solidifying behavioral norms:

> *"We had to go out and understand how to work on third-party equipment without drawings. It became a certain mindset, learning to put our heads into the OEM engineers' heads and solve our customer's problems. That's how we worked across all*

types of equipment, gaining experience, developing our own standards and a state-of-the-art service program" (ID 1).

Complementary, experiential learning with customers throughout the co-creation process was central to ingrain the value of understanding their operational realities as the pivot of independent service-based competition (cf. Aarikka-Stenroos & Jaakkola, 2012):

"We exposed top management to the customers to understand them, to sit and listen to what they need and then listen within their own organization to what is available to support them. They had to go back to the basics, the customer, to build the service organization" (ID 2).

Removing behavioral barriers to ingrain emergent ISP values and norms

Removing behavioral barriers involved institutionalizing an environment that motivates experiential learning from continuous leader-member interaction, observation and regulatory behaviors to teach junior members the expected way to think and behave about developing customer solutions (Holmqvist, 2004; Ostroff et al., 2012; Schein & Schein, 2017):

"We were trying to provide this learning experience, juniors working with senior managers. They took me to all the meetings to observe how to deal with customer expectations, to listen and really understand the root cause of their issues to develop solutions" (ID 3).

To create an ISP-oriented learning environment, management had to insulate the division from corporate influence to prevent the imposition of the OEM culture, which differs on fundamental dimensions such as time perception of projects, high power distance, static learning and uncertainty avoidance (Groysberg et al., 2018; Hofstede et al., 2010). This included a managerial *"buffer layer" (ID 15)* between the corporation and the division's middle and shopfloor management to cultivate entrepreneurial learning, autonomy and flexibility:

"The most important job was to keep the corporation away because the OEM mindset would suffocate the culture. They tended to standardize everything and think in project cycles up to 36 months. We needed our people to act rapidly, correct quickly and readapt. We had to build a defensive wall because they would kill the entrepreneurship, the creativity" (ID 1).

4.4.3.2 Rebalancing the global ISP culture

Rebalancing the global ISP culture required removing (1) belief barriers to develop global perspectives on ISP operations, (2) information barriers to surface different approaches to ISP operations and (3) behavioral barriers to encode rebalanced perspectives into ISP operations.

Removing belief barriers to develop global perspectives on ISP operations

Focused on the global expansion and integration of ISP capabilities, leadership was challenged to overcome local resistance to buy into global change programs *"to create an international service group with one culture" (ID 5)*. Regular events for regional leaders to network and systematically explore diverse perspectives and learning experiences established the foundation for global project communities in an increasingly complex organization (Baker & Sinkula, 2002). Global project communities became critical for dialogue-based decision-making, fostering shared commitment to change initiatives by *"designing projects as a big group to create a common sense of purpose, build the tools and systems to support the project and do the change themselves" (ID 11).* For example, the division created a common goal of reducing spare parts lead times across units in EMEA, APAC and the Americas by framing the rationale for improving customer-oriented operations from different perspectives, reinforcing cultural views with concrete business facts:

> *"The project kicked off with 70 people in cross-functional teams. Some thought we didn't need to reduce our lead time to keep customers happy. But they couldn't argue about improving cash flow when moving orders faster, so they had to believe there's a benefit. If someone didn't believe in our customer philosophy, they believed in the fact" (ID 11).*

Removing information barriers to surface different approaches to ISP operations

Removing information barriers involved organizational self-appraisal to identify and modify tacit structures (Baker & Sinkula, 2002; Huber, 1991). Continuing the example of parts lead-time reduction, the division addressed mismatches between operations and customer demands to drive single-loop learning, incrementally adapting structures and processes (Argyris & Schön, 1996; Dauber et al., 2012). External perspectives helped reveal residual OEM artifacts, such as language reflecting lengthy project timelines, that

have fallen out of awareness (Schein & Schein, 2017). These insights informed procedures and technologies to contextualize learning around lead time reduction (Holmqvist, 2004), encouraging members *"to think in hours or days instead of weeks or months"* (Annual Report, 2017):

> *"Some of the things the consultants told us are obvious, but we were blind to them, was that as an OEM, our language centered around weeks. So, we changed the ERP to set targets and measure against minutes. We also went from backward to forward scheduling, knowing it would increase our inventory levels. Still, it was necessary to create this culture of pushing things through the system as quickly as possible" (ID 11).*

Beyond dedicated projects, change managers developed tools to scan for variations in service unit values, structures and standardization influenced by regional business cultures (Classen & Friedli, 2021). Goals of measurement were *"to ensure that all staff operate consistently with a set of shared values and behaviors which drive execution performance", "to manage trade-offs between competing objectives or commitments that have been made and ensure suitable alternatives are developed"* and that *"corporate goals are reflected in the day-to-day operations" (ID 4, internal presentation)*. Insights guided initiatives to bridge the global ISP vision and local practices, addressing regional issues such as a disadvantageous overemphasis on customer requests or an entrepreneurial focus that undermined service quality (Ambroise, Prim-Allaz, & Teyssier, 2018; Raddats et al., 2019):

> *"We implemented a worldwide assessment about company maturity, customer focus (…), focused on creating a culture of doing things together. We graphed and watched the development in regions. Asia turned around especially. Their idea of customer management was to do what the customer says even if it's not in the contract. It's not in their [regional] culture. Trainings allowed them to become more profitable immediately" (ID 4).*

Removing behavioral barriers to encode rebalanced perspectives into ISP operations

Removing behavioral barriers helped members to develop norms with fewer blockages to the global ISP vision (Weick & Quinn, 1999). The evaluation of the parts lead-time program showed that *"one of the most important things was a change of mindset"*, which required *"motivation from everybody involved"*, systems and incentives to embed *"new*

ways of doing things" (Annual Report 2017). A global system visualized orders, project status and targets, replicating "*airport departure screens with opened jobs in green and unprocessed MRP becoming red" (ID 11).* The approach created a sense of urgency on the shopfloor and a motivational state of competition between members and units. Progressive goal adjustment focused on gradual behavioral change, balancing competition with psychological safety to mitigate fear of failure (cf. Baker & Sinkula, 2002):

> *"Over a five-year period, we gradually reduced target times (...) We didn't want to establish a culture of beating up people, with everybody having red screens and then becoming demotivated. We just kept lowering the waterline, let them enjoy being successful. Even with a change of leadership it endured because it was part of the way we do business" (ID 11).*

Transformational behaviors of regional leaders supported the integration and institutionalization of global change initiatives by reinforcing members' cognitive link between their local behaviors and the global ISP vision (Flores et al., 2012). Open communication about servitization across all levels fostered a sense of service pride and purpose as emotional rewards for committing to the global ISP vision (Zabala et al., 2022):

> *"We try to instill pride in the employees' work and make corporate success relevant to them, which allows us to invest in the location. We hold town halls in every shop to tell the guys how the company is doing, what challenges we have and what we should celebrate" (ID 3).*

4.4.3.3 Unfreezing the ISP learning culture

Unfreezing the ISP learning culture required removing (1) belief barriers to transform the global ISP network into a learning organization, (2) information barriers to integrate knowledge throughout the ISP network and (3) behavioral barriers to unfold entrepreneurial learning orientation throughout the ISP network.

Removing belief barriers to transform the global ISP network into a learning organization

During the Driver-Driven and Services Days, belief barriers were removed to acknowledge the ISP culture not only as the residue of past learning but as a framework for shaping future learning (Schein & Schein, 2017; Sørensen, 2002; Wolf et al., 2022).

Leadership had to gain management buy-in and overcome corporate inertia and hierarchies to integrate service capabilities across manufacturing groups that were *"incredibly fragmented, not learning anything from each other" (ID 14)* within a *"dynamic culture of learning and change" (ID 5)* to shape the service-driven learning organization. Servant leadership modeled organizational learning to bridge the cultural divide between turbomachinery services and the product-oriented pumps services organization, fostering openness, inclusiveness and bottom-up information flow through empathetic and participative decision-making (Eva et al., 2019; Flores et al., 2012). Focused on identifying and responding to members' needs during the transformation, servant leadership exemplifies and thus reinforces service and customer orientation across the integrated ISP network (van Dierendonck, 2011):

> *"If you can't make your promises inside your organization, how are you going to make your promises to your customers? That's a cultural aspect that has to be universal. Honesty, openness and commitment to doing what you say has to be perceived throughout the organization. Introducing this new way of thinking took a certain amount of respect on both sides [turbomachinery and pumps services]. We had people coming forward with excellent ideas from their worldview. But when you put it in context, it won't support the transformation. It was essential to discuss with each person and bring it into perspective and the Venn diagram started overlapping and getting beyond just their view" (ID 1).*

Removing information barriers to integrate knowledge throughout the ISP network

Removing information barriers involved an integrative approach to finding, distributing and institutionalizing information across service units, giving it a shared meaning (Huber, 1991; Weick, 2001). Building on leadership efforts to foster openness to diverse information sources, change managers convened global management teams to develop a unifying language to capture the ISP network's capabilities and skills. Knowledge integration involved continuous database development and case studies on the complementarity of units. Collaborative refinement of the corporate language reconciled tensions between previously separate service units and acquired competitors, advancing the M&A-driven reconfiguration of the division (Xing et al., 2017). This participative approach facilitated the integration of new knowledge, which is less likely to be accepted if it deviates too much from established mindsets (Flores et al., 2012):

> *"Every group within every region had different words for the same activity, which needed to be connected. Building a common language was important as we also had tensions between businesses. Some had competed in the past. We created a database to easily fill in what we were selling and the capabilities needed. We also created one-page case studies on course-received complementarity of the different parts of the business" (ID 4).*

Removing behavioral barriers to unfold entrepreneurial learning throughout the ISP network

Removing behavioral barriers involved cascading entrepreneurial learning behaviors through senior-level change agents "*with a perspective across the entire corporation, able to communicate effectively with the CEO and give weight to managers leading change in regions with less buy-in" (ID 5)*. Strengthening relationships and trust among members from the integrated units was important to embed network learning behaviors as an inter-organizational learning mechanism to drive the transformation (Thornton et al., 2015). Continuing the example of refining corporate language, regular meetings were *"(...) protected from daily business, bringing together seniors and juniors who were used to a hierarchy, feeling that their point of view is important" (ID 4)*. These psychologically safe spaces brought together members across units, regions and hierarchies, experiencing collaboration and fostering open discussions about successful behaviors and failures, breaking down silos and adopting autonomous decision-making. Complementary, learning-oriented training programs developed *"people, processes and tools" (ID 4)* to support members embrace their evolving roles in managing complex projects as a collaborative learning network:

> *"We started project management courses to bring the engineers together, improve them and give them tools to implement what they learned. We implemented networks to support them in complex projects and get experts to know each other. We had to get away from the overall culture of nobody caring about anybody else as long as they made their numbers" (ID 4).*

4.5 Discussion and conclusions

The analysis unfolds how the case company, over time, developed an ISP culture focused on challenging the OEM service market with customized third-party solutions. Figure 1

situates the key concepts of the change content and process (Figure 3–4) within our organizational learning framework. The bottom-up and top-down arrows connecting ISP values, strategies and structures illustrate the external adaptation and internal integration across four contextual episodes (Figure 2). These processes relied on managerial practices to translate emergent cognitive and behavioral patterns into service-driven learning. In discussing the framework, we provide theoretical and practical contributions and suggestions for future research.

4.5.1 Theoretical contributions

This research contributes to the discussion on cultural change in servitization. Responding to recent calls, we used a long-term, retrospective and theory-driven case study to unfold the change's emergent and human aspects (Martinez et al., 2017; Rabetino et al., 2018). Using an organizational learning framework, we captured the emerging content of ISP values, strategies and structures during an OEM's 35-year servitization (Biesinger et al., 2024; Schein & Schein, 2017). Second, we employed Weick & Quinn's (1999) continuous change intervention theory to map the managerial practices that shape the ISP culture as an organizational learning process.

As the first contribution, this study reveals the content of the emerging ISP culture as the residue of learning across the four episodes characterizing the change context. Consistent with the current servitization and organizational learning literature, we unpacked cultural shifts through orientations that permeate values, strategies and structures (Baker et al., 2022; Biesinger et al., 2024), reflecting the meaning members attach to their experiences of how the organization approaches the independent service market (Schein & Schein, 2017; Weick & Quinn, 1999). The shift toward independent service orientation redefined the organization's identity as a provider of total solutions beyond the installed base. This involved rethinking competitive advantage by developing strategies and structures that empower members accustomed to viewing services as product support to embrace the uncertainty of advanced services and outperform OEMs in supporting customer processes (Brax et al., 2021; Davies et al., 2006). The shift toward customer orientation focused value-creation on solving customer problems rather than technological features, adopting the customer's perspective to continuously innovate responsive structures (Gebauer et al., 2011; Martinez et al., 2017). Entrepreneurial learning orientation contrasts the OEM's rigid analytical focus on incremental optimization in production, R&D and sales, shifting

the organization to experiential and interorganizational learning from service operations and customer relationships (Martinez et al., 2010, 2017; Xing et al., 2017). Openness and commitment to learning from multiple sources were essential to shaping the ISP culture through bottom-up innovation guided by the global ISP vision (Baker et al., 2022; Sinkula et al., 1997).

We argue that servitizing manufacturers must manage the emergence of all three cultural orientations: service and customer orientation to support a service-driven business model and entrepreneurial learning orientation to build the capacity for changing business logics, processes and capabilities (Biesinger et al., 2024; Brax et al., 2021). The latter is particularly critical as the transformation from products to services ultimately depends on changing cognition and behavior (Vargo & Lusch, 2004, 2008). Developing the cultural capacity to continuously acquire, distribute, integrate and institutionalize experiential knowledge in a service- and customer-oriented way appears to be the "crucial capability for survival" of the service-driven learning organization (Brown & Eisenhardt, 1997, p. 1; Flores et al., 2012).

Concerning the second main contribution, this study unveils the organizational learning practices to shape bottom-up learning processes and manifest the ISP culture through strategic guidance and structural operationalization (Biesinger et al., 2024; Schein & Schein, 2017). While confirming the importance of aligning servitization values, strategies and structures (Brax et al., 2021; Lexutt, 2020), our findings advance research on continuous change models (Baines et al., 2020; Kohtamäki et al., 2021; Martinez et al., 2017) by clarifying the managerial practices that sustain cultural alignment in the long-term. Three streams of managerial practices to remove belief, information and behavioral barriers to servitization shaped the ISP culture as an organizational learning process. First, freezing the emerging ISP culture involved institutionalizing a learning environment protected from OEM influences to observe, validate and attach meaning to behaviors that co-create value inherited mainly from OEM Days' service management and acquisitions, manifesting "a hard-to-imitate resource resulting from customers and employees who co-create service" (Gebauer, Edvardsson, & Bjurko, 2010, p. 238). Second, rebalancing the global ISP culture focused on institutionalizing interorganizational learning to streamline service and customer orientation by linking global strategy with regional learning loops. Third, unfreezing the ISP learning culture focused on institutionalizing network learning by integrating explicit and tacit knowledge from integrated and acquired service units and

developing a unifying corporate language that deconstructed outdated hierarchical paradigms within and between them.

We argue that the distinct quality in the path toward servitization culture lies in shaping a learning environment that accommodates emergent and intended change, as suggested by Biesinger et al. (2024). Managerial practices intertwined these dynamics by (1) capturing early emergent cultural patterns to create a cultural platform for (2) transforming function-based manufacturing into a learning network that supports advanced solutions through integrative communication and knowledge flows. The first aspect highlights the integrative management of belief, information and behavioral barriers to bridge member and organizational levels, fostering the organic development of the ISP culture by supporting members to understand how their behavioral adaptions collectively sustain performance in the emerging service system (Gebauer & Fleisch, 2007; Weick, 2001; Wiewiora et al., 2019). Thereby, managerial practices must continuously balance exploration and institutionalization, adapting to the organization's evolving maturity and challenges such as harmonizing local innovation with global manifestation of service-driven behaviors (Baker et al., 2022; Holmqvist, 2004). The second aspect suggests that cultural change may not have been achievable by the OEM alone, requiring interorganizational learning through integrating external entities into the change process (Öberg, 2023; Tronvoll et al., 2020). Throughout the servitization journey, managerial practices evolved from fostering openness to explore the service market through acquired ISPs towards reconfiguring the integrated value, strategy and structure system of service units and strategic acquisitions, while sustaining this ambidexterity to transform the ISP network into a service-driven learning organization (Brix, 2019; Xing et al., 2017).

In conclusion, while servitization appears linear in hindsight, organizational learning practices responded to "a series of fast mini-episodes of change" as they emerged to create an ISP culture that underpins the "tendencies to normalization" depicted in the maturity stages in Figure 2 (Weick & Quinn, 1999, p. 377). Moreover, our findings add to the growing stream of literature that portrays servitization as a complex multilevel process by unveiling the managerial practices to integrate learning loops across member, organizational and network levels (Struyf et al., 2021; Valtakoski, 2017). Accordingly, organizational learning practices require emphasis during servitization to achieve the desired outcomes and in servitization research to understand, explain and predict the performance effects of cultural change.

4.5.2 Practical implications

Our organizational learning framework provides an outlook for managers to understand what cultural change in industrial servitization entails and how to implement it over time. Developing contextualized practices to shape the emergence of servitization values, strategies and structures is essential when planning large-scale transformation. While servitization roadmaps may seem appealing, change must be managed through practices that allow for "the realization of a new pattern of organizing in the absence of explicit a priori intentions" and provide the flexibility to address transformational challenges as they arise (Orlikowski, 1996, p. 65). It is crucial to understand the organizational learning environment as a methodological tool to manage change, both continuous and intended, as a process that interrelates multiple organizational and network levels by facilitating bottom-up emergence and top-down manifestation of the cultural patterns that sustain the service-driven learning organization.

The study reveals three sequences as a guiding framework to develop organizational learning practices to support the cultural change towards independent service provision. We suggest managers assess cultural resources to freeze, rebalance and unfreeze, avoiding the imposition of a service vision disconnected from the existing cognitive and behavioral base. The study suggests envisioning independent service, customer and entrepreneurial learning orientation while heedfully developing practices to overcome belief, information and behavioral barriers accounting for global, regional and unit-specific change requirements and balancing universal change goals with operational degrees of freedom. Thereby, we emphasize the role of leadership in creating an experiential learning environment that fosters participation and psychological safety, encapsulated by the quote of a transformation manager in our case study: "Too often people think change is done to them, but they have to do it themselves."

Finally, cultural change in servitization is a non-linear, complex and lengthy process that presents significant and often overwhelming challenges to managers (Kohtamäki et al., 2021; Martinez et al., 2017). The study shows that simultaneous influences from corporate restructuring, internationalization and post-merger integration can complicate the process. Based on our findings, we recommend prioritizing organizational learning strategies early in the transformation to cultivate the capacity to anticipate, manage and adapt to change, while facilitating the unlearning of product-oriented assumptions that impede

servitization. Managing the path toward servitization culture involves leveraging emerging cultural patterns but relies on developing the cultural conditions to embrace and execute the transformation.

4.5.3 Limitations and suggestions for future research

This study adhered to design principles for researching emergent phenomena and qualitative case research in industrial marketing management to ensure methodological rigor (Kozlowski et al., 2013; Lindgreen, Di Benedetto, & Beverland, 2021; Lindgreen, Di Benedetto, Thornton, et al., 2021). However, we acknowledge the limitation that our framework emerges from a single case study. While the trustworthy research design depicted in Table 3 ensures high validity from in-depth data analysis, the use of a single case constrains generalizability. Nonetheless, the framework can provide valuable guidance for other cases, as literature on cultural change in servitization calls for in-depth interview and document research to provide detailed empirical descriptions of the change dynamics in manufacturing cultures (Gebauer, Edvardsson, & Bjurko, 2010; Kohtamäki et al., 2021). As servitization journeys do not follow a single, linear path, we encourage further processual research to deepen understanding of the characteristics and dynamics of cultural change, enriching the empirical base of servitization beyond objective variance. Second, expanding the methodological scope would benefit case research in servitization (Rabetino et al., 2018). Bayesian process tracing (George & Bennett, 2005) and configurational analysis (Salonen et al., 2021), bridging qualitative and quantitative reasoning, offer opportunities to address concerns about single cases by unveiling necessary mechanisms and concrete pathways to servitization culture. Third, while our study captures perspectives from service units, acquired service providers and corporate start-ups, it focuses on the transformation of the focal division. We suggest comparative cases and embedded single case studies with multiple units of analysis to deepen understanding of the interorganizational learning dynamics of manufacturers servitizing through the integration of service providers (Yin, 2018). Fourth, in response to calls for middle-range change theories, we invite servitization researchers from fields such as individual, social and organizational psychology, to build on our organizational learning framework and advance multilevel research on cultural change in servitization (Biesinger et al., 2024; Rabetino et al., 2018; Struyf et al., 2021).

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5. Contributions, limitations and research opportunities

This dissertation aimed to examine how manufacturers change their organizational culture as they transform into industrial service providers and the practices that facilitate the change process. The studies in sections 2-4 approached this aim by contributing to the challenges outlined in section 1. The results provide theoretical contributions, practical implications and suggestions for a research agenda.

5.1 Theoretical contributions

This dissertation primarily contributes to understanding the cultural changes manufacturers experience when becoming industrial service providers. By employing an organizational learning perspective, this research gains conceptual and empirical insights into the content, process and context of cultural change in servitization.

Introducing an organizational learning perspective on cultural change in servitization

This dissertation introduces organizational learning as a framework to explore the emergent and human aspects of change in servitization (Gebauer et al., 2010; Kohtamäki et al., 2021; Martinez et al., 2017; Rabetino et al., 2018). In response to calls for a social constructivist perspective in servitization (Kohtamäki et al., 2019), this research integrates organizational learning with rationale derived from multilevel theory and sensemaking to conceptualize a processual view of servitizing manufacturers (Ostroff et al., 2012). The conceptual and empirical application of the framework unveiled cultural change as a process of experiential learning, where members align their shared cognition and behavior to the changing business context through knowledge acquisition, distribution, integration and institutionalization. Accordingly, the three articles presented in this dissertation address the need for servitization frameworks that can trace the social processes of multilevel change dynamics by clarifying organizational and member-level concepts of servitization culture and their interrelation in emergent processes through learning loops (Lenka et al., 2018a, 2018b; Paschou et al., 2020; Rabetino et al., 2017; Struyf et al., 2021). The framework's explanatory value for process studies and its compatibility with management theories, such as dynamic capabilities, contributes to developing mid-range theories that address the particularities of servitization change processes (Rabetino et al., 2018). Finally, addressing multilevel learning bridges the academia-practice gap, as single-level simplifications often fail to account for process methodologies and real-

world change management challenges (Kozlowski et al., 2013; Langley et al., 2013; Molina-Azorín et al., 2020).

Conceptualizing and operationalizing industrial and digital servitization culture

This dissertation builds on the organizational learning perspective to define the concepts, constructs and variables of servitization culture. Recognizing the interplay between organizational (i.e. company, service unit) and member level (i.e. members and groups), it organizes cultural properties as servitization values, strategies, structures, mental models and change intervention. A framework-driven systematic literature review structured extant knowledge on cultural change in servitization and integrated insights from related fields. The approach organized 57 constructs and 189 variables defining the five concepts of servitization culture. Synthesizing these findings provides researchers with a coherent language following Van de Ven's (2007) concept-construct-variable logic to position their work within the field of change in servitization and guide future research. The conceptual and empirical findings of this dissertation identify four major cultural orientations that permeate organizational values, strategies, structures and members' mental models, which reflect the accumulated shared learning of servitized organizations (Baker et al., 2022; Brax et al., 2021; Schein & Schein, 2017). These include service and customer orientation for transitioning to a service-driven business model, digital orientation for digital service innovation and provision and learning orientation for fostering the cultural capacity to change business logic and capabilities. The conceptualization of digital orientation advances the limited research on digital servitization culture in Industry 4.0, extending beyond organizational change to the sociocognitive dynamics of digital service ecosystems. The main contribution is identifying the significant role of learning orientation and its function as a moderator of service, customer and digital orientation in promoting service innovation and performance. Since the transition to services ultimately relies on changing cognition and behavior (Vargo & Lusch, 2004, 2008), cultivating service-driven learning is recognized as the central capability of servitizing manufacturers.

Extending the notion of continuous change in servitization

This dissertation provides an organizational culture and learning perspective on the longstanding challenge of understanding servitization as a continuous process, influenced by collective and individual events over time (Baines et al., 2020; Kowalkowski et al., 2012; Martinez et al., 2017). Building on organizational learning (Baker & Sinkula,

2002), the findings identify practices for managing the interplay of cultural emergence and contextual changes by continuously removing belief, information and behavioral barriers to servitization (Baines et al., 2017; Dmitrijeva et al., 2020). Thus, organizational learning practices enable the continuous exploration, validation and embedding of service-driven cognition rather than radically replacing product cultures (Gebauer et al., 2009; Story et al., 2017). The continuous change lens illustrates practices that promote the stages of servitization maturity (cf. Baines et al., 2020; Brax et al., 2021), which represent "tendencies to normalization" within an ongoing cycle of external adaptation and internal integration by servitizing manufacturers (Schein & Schein, 2017; Weick & Quinn, 1999, p. 377). Furthermore, this research addresses calls to move beyond the prevalence of planned change models by applying continuous change intervention theory to conceptually organize organizational learning practices (Wagstaff et al., 2021; Weick & Quinn, 1999). Rather than "unfreezing" product cultures, the findings demonstrate the explanatory value of viewing cultural change as a sequence of freezing emergent servitization cues, rebalancing them to meet transformational needs and unfreezing a learning culture that embraces non-linear change. In conclusion, these insights enrich the literature on servitization roadmaps by deepening the understanding of continuous change dynamics, models and practices, shifting the focus from the "what" to the "how" of servitization.

Extending the notion of interorganizational change in servitization

This dissertation contributes to the nascent literature of manufacturers servitizing through mergers and acquisitions (M&A) and strategic partnerships (Öberg, 2023; Paiola et al., 2013; Xing et al., 2017). While prior research mainly focused on dyadic relationships shaping change within servitizing manufacturers and their customers' organizations (Sjödin et al., 2017; Valtakoski, 2017), this research extends the notion to interorganizational change processes involved in the continuous development and internationalization of service organizations through M&A. Building on interorganizational learning literature (Brix, 2019; Holmqvist, 2003, 2004), Article 3 expands the understanding of acquiring service providers beyond adding and reconfiguring service capabilities (cf. Xing et al., 2017) to a transformative means for embedding service, customer and learning orientation within manufacturing cultures. The study shows that manufacturers can explore the opportunities of service-based competition by integrating service providers without product heritage (Burton et al., 2022), thereby removing managerial belief barriers such as recognizing service revenue potential that outweighs the costs of cultural resistance

(Gebauer & Fleisch, 2007; Zabala et al., 2022). In line with this research's emphasis on learning orientation, cultural change through post-merger integration requires the development of a learning culture across all entities of the servitizing and acquired organizations. Institutionalizing network learning behaviors and participative decision-making as interorganizational learning mechanisms create a cultural foundation for advancing servitization maturity. This enables the service network to adjust values, strategies, structures and capabilities through targeted acquisitions aligned with market needs. Furthermore, this research contributes to service-driven internationalization, as Article 3 highlights the role of interorganizational learning networks in aligning servitization culture across regional units. By integrating a global corporate vision with regional learning processes, internationalizing service organizations manage regional cultural differences, resistance and varying servitization maturity levels (Bıçakcıoğlu-Peynirci & Morgan, 2023; Classen & Friedli, 2021; Xing et al., 2023). In conclusion, this research reinforces the emerging view that manufacturers cannot achieve servitization and cultural change alone (Öberg, 2023; Tronvoll et al., 2020; Xing et al., 2017), requiring interorganizational learning between integrated internal and external service entities.

Extending servitization culture as a transformative response to contemporary challenges

This dissertation contributes to the discussion of how servitization can address contemporary challenges from persistent societal disruptions. Addressing recent service research priorities, it argues that manufacturers can align service-driven and societal goals through cultural change, facilitating servitization and digital service innovation (Ostrom et al., 2015) to foster economic and environmental resilience (Ostrom et al., 2021) and sustainable service ecosystems (Field et al., 2021). First, an increasingly disruptive business environment requires organizations to become more sensitive to emerging customer needs and to broaden the stakeholder context for innovation (Heinonen & Sörhammar, 2024; Heinonen & Strandvik, 2020). The organizational learning framework advances research on the social and sustainable performance of servitizing manufacturers (Menon et al., 2024; Zhang et al., 2022) by addressing the roots rather than the branches of servitization, enabling transformative service systems by organizational design. Specifically, it provides a foundation for research exploring organizational learning practices that continuously align service-driven change with growing stakeholder awareness of employee and customer satisfaction (Zhang et al., 2022) and circularity (Kreye, 2023). Second, addressing contemporary challenges requires the capability to combine technological advances

with emerging market needs (Kavadias et al., 2016). Article 1 conceptualizes digital servitization cultures as the sociocognitive foundation for open, trustworthy digital service ecosystems that facilitate broader stakeholder integration, such as remote customer resource optimization (Raddats et al., 2022). Article 2 expands on this by introducing service-driven learning cultures as a dynamic capability that continuously reconfigures technological and organizational service resources, fostering industrial resilience in turbulent environments (Teece, 2007; Teixeira & Werther, 2013). Specifically, the findings propose cultural configurations that explain how organizational learning translates into digital service innovation capabilities, enabling radical improvements in transformative service systems through Industry 4.0 technologies such as IoT and AI.

5.2 Practical implications

This dissertation aims to support practitioners in managing cultural change in servitization by guiding the transformation into a service-driven learning organization. Following Baines et al.'s (2017) call for prescriptive change agendas, this research integrates its findings with DiBella & Nevis's (1998) strategic perspective on learning organizations to formulate principles for developing service-driven learning strategies and practices.

Foundations of an organizational learning strategy for cultural change in servitization

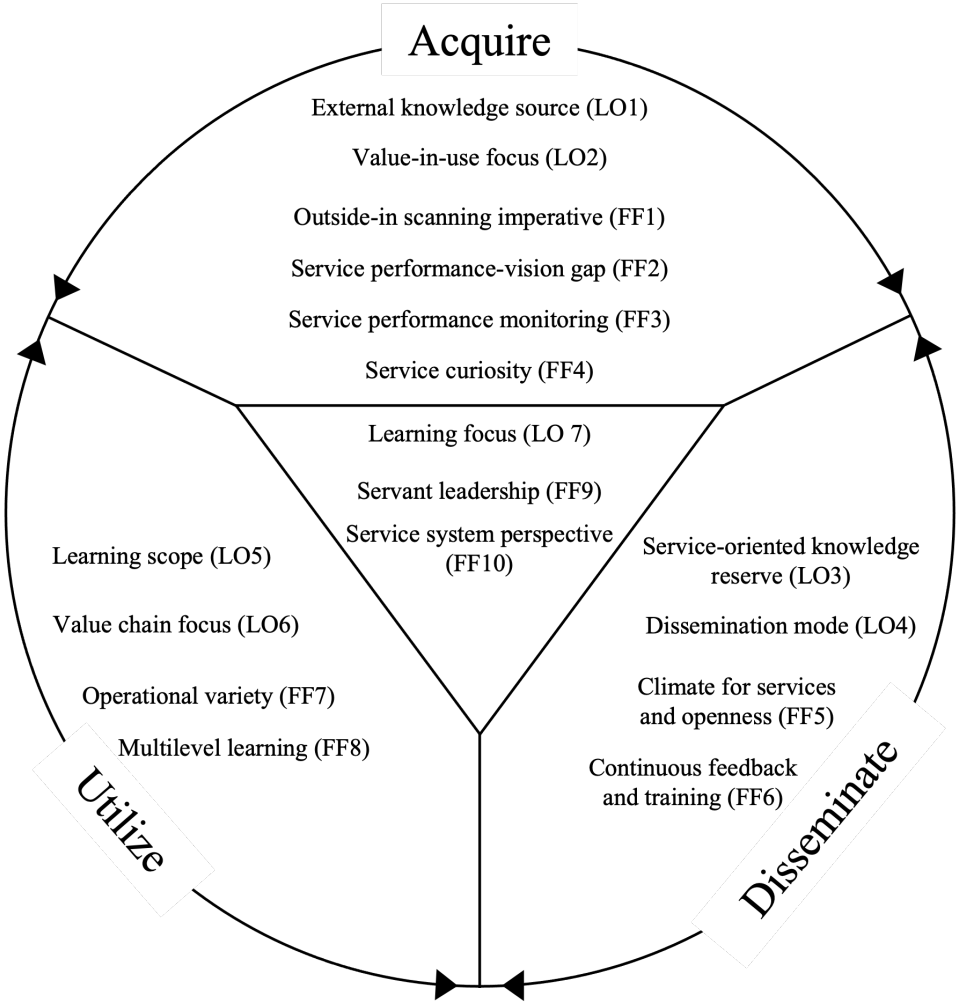
Service-driven learning strategies aim to create cultures that can provide the capability to continuously shape values and behaviors based on servitization knowledge, with managers anticipating transformational challenges and applying organizational learning practices to address them (DiBella & Nevis, 1998). Following its conceptual underpinning, this research recommends conceiving cultural change in servitization as a cyclical process of knowledge acquisition, dissemination and utilization (Flores et al., 2012; Huber, 1991):

- *Knowledge acquisition.* The process of assigning meaning to continuous aftermarket experiences to enable the dissemination and use of emergent social cognition.
- *Knowledge dissemination.* The process of converting and sharing tacit social cognition to be retained as the organization’s responses to servitization cues.
- *Knowledge utilization.* The process of using shared cognition to reshape values, strategies, structures and behaviors in line with the desired servitization outcomes.

Each phase can be improved through learning capabilities consistent of (1) learning orientations, which shape the patterns of service-driven learning, and (2) facilitating factors,

which define the structures and practices influencing the learning processes (DiBella & Nevis, 1998). Managers can apply this research to evaluate their organization and identify the orientations and factors needed to achieve their vision. As depicted in Figure 1, managers should consider seven forms of service-driven learning orientation and ten facilitating factors to design their change strategies. Grounded in this research and seminal organizational learning literature (Baker et al., 2022; DiBella & Nevis, 1998; Senge, 2006), three design factors are set in the center, serving as the foundation for the learning circle.

Figure 1: Integrated approach to create the service-driven learning organization



Design principles for service-driven learning orientations

Learning orientations (LOs) are guiding assumptions defining how and what the servitizing organization learns (DiBella & Nevis, 1998). This research argues that learning investment choices are key to change management, as experience from implementation shapes service-driven learning. Aligned with the product-service continuum (Oliva & Kallenberg, 2003), learning orientations span contrasting learning styles, ranging from

manufacturing to service focus. Manufacturers may adopt a mix of learning orientations along the following continua, depending on their extant culture and servitization strategy:

- *Knowledge source (LO1).* Preference for internal knowledge development through R&D versus external acquisition from service operations, customer relationships, service-driven partnerships and M&A.
- *Transactional-use focus (LO2).* Emphasis on knowledge for value creation through product sales versus product-service systems generating value-in-use.
- *Service-oriented knowledge reserve (LO3).* Service knowledge held by specialists versus the integration of service orientation across the organization.
- *Dissemination mode (LO4).* Service knowledge shared in formal channels versus informal, embedded methods such as service-oriented leader-member interaction.
- *Learning scope (LO5).* Knowledge focused on incremental improvements in product-support services versus developing customer process solutions.
- *Value-chain focus (LO6).* Emphasis on learning investments in upstream activities (product features) versus a downstream focus on delivering customer value.
- *Learning focus (LO7).* Knowledge development focused on individual performance versus open, committed knowledge development for group performance.

The seven dimensions illustrate how organizational learning can support the change to a servitization culture and the learning processes of a service-driven learning organization. Given servitization's continuous, non-linear nature, various learning styles can drive performance by institutionalizing different values and behaviors. The framework helps managers access this capability, guiding design decisions on facilitating factors.

Design principles for facilitating factors of service-driven learning

The second part of the framework consists of facilitating factors (FFs) determining the effectiveness and efficiency of the organizational learning cycle (DiBella & Nevis, 1998). While learning orientations describe the design of service-driven learning organizations, facilitating factors define the practices and structures that shape learning processes. Collectively, these factors determine the cultural change capacity. Integrating normative views on learning organizations with this research's findings on organizational design and change practices in servitization (DiBella & Nevis, 1998; Garvin, 2000; Senge, 2006, 2014a, 2014b), the following framework of facilitating factors is proposed:

- *Outside-in scanning imperative (FF1).* Members gather information about service innovation and provision outside their unit, living with customers and building learning partnerships with industrial service providers.
- *Service performance-vision gap (FF2).* Shared perception of the gap between current and desired service performance.
- *Service performance monitoring (FF3).* Service performance definition and measuring is prioritized and considered as a service-driven learning activity.
- *Service curiosity (FF4).* Curiosity about organizational, technological and marketing practices to develop creative solutions to solve customer problems.
- *Climate for services and openness (FF5).* Members openly communicate and share problems and lessons to improve service excellence.
- *Continuous feedback and training (FF6).* Commitment to providing service-driven learning resources based on continuous service performance feedback.
- *Operational variety (FF7).* Members value diverse practices and skills to continuously improve product-service-software-systems and customer solutions.
- *Multilevel learning (FF8).* New ideas and practices can be advanced from the bottom-up, ensuring service innovation aligns with operational requirements.
- *Servant leadership (FF9).* Leaders actively shape service-driven learning environments and model service and customer orientation through their behavior.
- *Service system perspective (FF10).* Recognition of interdependencies within the (digital) ecosystem of service and product units, customers and service partners, with an awareness of time delays between servitization initiatives and outcomes.

The integrated elements in Figure 1 offer a prescriptive tool for managers to assess and transform their organizational learning profile. Developing a service system perspective is central to anticipating learning barriers, bridging organizational-, member- and network-level activities into service-driven learning processes and moving beyond manufacturers' learning orientations by "developing the capability of seeing the forest and the trees" when shaping servitization culture (Senge, 2014b, p. 125). Decomposing change complexity into a continuous cycle of three learning processes, seven learning orienta-

tions and ten facilitating factors provides a systematic approach for improving stakeholder communication and creating a basis to initiate, manage and sustain the transformation into a service-driven learning organization.

5.3 Limitations and suggestions for a research agenda

This dissertation aimed to advance insights supporting academics and practitioners in addressing cultural change in servitization. The research opportunities arise from extending these aims, the levels of analysis and the choice of methodology and data.

Advancing servitization culture research from Industry 4.0 to Industry 5.0

Responding to calls to transition from technology-driven Industry 4.0 to value-driven Industry 5.0, service research is placing greater emphasis on the long-term service of the industry to humanity rather than solely addressing technological and societal changes (Field et al., 2021; Ostrom et al., 2010, 2015, 2021; Van Doorn et al., 2025). Industry 5.0 will likely expand the role of cultural change in shaping human-centric, sustainable and resilient service ecosystems that integrate societal, organizational and sociotechnological value perceptions (Breque et al., 2021; Leng et al., 2022).

A significant aspect is mutual-cognitive human-robot collaboration (HRC), where service robots, employees and customers engage at the cognitive level to co-create value by developing a shared understanding of context, goals and learning experiences (Leng et al., 2022; Odekerken-Schröder et al., 2022). In response, this research advocates extending servitization culture as a transformative means to foster the sociotechnological complementarity of human and artificial intelligence, advancing services through social robots (Van Doorn et al., 2025). This transformation highlights the need to research the effective integration of robots into servitization cultures and how they impact change on multiple intra- and interorganizational levels. Researchers can build on this dissertation's integrative organizational learning perspective to examine HRC-driven change at the service ecosystem, organizational and member levels individually and in combination. While this research identified organization-level cultural factors for creating and managing digital service ecosystems, future studies should explore service ecosystem cultures and how to align human and robot actors' values with Industry 5.0's vision of human-centricity and sustainability. As culture emerges from the bottom up, HRC-driven member-level

changes in cognition and behavior are particularly interesting in informing change management research and practice that restores human agency and anchors human-centricity in sociotechnological systems (Breque et al., 2021; Odekerken-Schröder et al., 2022).

In line with recent digital service innovation literature (Rabetino et al., 2023; Van Doorn et al., 2025), this research encourages multidisciplinary research to advance servitization culture research from Industry 4.0 to Industry 5.0. Specifically, it advocates integrating service, marketing and information systems research into human-robot roles and relationships (Blaurock et al., 2022; Lu et al., 2020; Van Doorn et al., 2017), customer-dominant service ecosystems (Bruhn et al., 2024; Lipkin & Heinonen, 2022) and robot learning to align the values embedded in social robots with those of servitizing organizations (Li et al., 2008; Schmiedel et al., 2021).

Extending multilevel research in cultural change in servitization

A crucial aspect of the organizational learning perspective presented in this research is the interaction of change factors across multiple levels. While the conceptual and empirical findings capture certain effects of interorganizational learning, regional and industry-related contextual factors, the focus is on explaining the bottom-up emergence of servitization cultures through the interplay of organizational and member-level constructs. Since the choice of theory and analysis levels shapes the research focus, assumptions, questions, theoretical and practical contributions, extending multilevel research can arguably advance future studies on cultural change in servitization (Klein et al., 2000; Klein & Kozlowski, 2000).

Multilevel theory views culture as a hierarchical system where lower levels nest within higher domains, with members forming groups within units that collectively shape organizations operating within networks and a broader environment and culture (Chao, 2000). Building on recent discussions on micro and macro levels in servitization research, this dissertation advocates for expanding research on the individual and interorganizational level (Lenka et al., 2018a; Struyf et al., 2021). First, while this research focused on social learning, members introduce individual values and traits into their organizations, which influence cultural change processes (Sagiv & Schwartz, 2007). Building on Earley & Randel (1997), incorporating an individual-level perspective can enhance future research by directly linking servitization culture to behavior. Individual cultural manifestations, shaped by shared meanings and personal traits, define an organization's behavioral

boundaries and may better predict behavior than social constructs (Chao, 2000). Future research could examine how individuals from diverse organizational and professional backgrounds adapt to servitization. Personal perceptions of their background and the servitizing context, as complements to shared servitization values, may explain change readiness, resistance and outcomes. Second, this research advocates a network perspective to advance studies on interorganizational learning between manufacturers and their service-driven M&A and partnerships. The network perspective views cultural details as shaped by social relations, allowing the identification of emerging cultural networks across different levels within a setting (Kilduff & Corley, 2000; Yammarino & Dansereau, 2010). Specifically, this research encourages to identify the distinct member-level structures of pure service providers that contribute to success in industrial service markets as well as the informal networks and the role of boundary spanners in translating tacit knowledge into interorganizational learning to influence servitization cultures of manufacturers. Network analysis, as an inductive method, can improve theory building from embedded single cases of acquired service providers within a manufacturer and comparative cases of service-driven M&A among manufacturers (Yammarino & Dansereau, 2010; Yin, 2018).

In conclusion, applying multilevel theory and methods could advance research on cultural change in servitization by examining individual, social, organizational and interorganizational phenomena both separately and in combination. This approach could also extend to industrial, regional or national cultural levels. For instance, it could examine how individual perceptions of these factors affect interorganizational learning during the service-driven internationalization of manufacturers.

Configuration and intervention as a research strategy for cultural change in servitization

This research addresses calls to study cultural change dynamics in servitization through qualitative interview data and company documents (Gebauer et al., 2010; Kohtamäki et al., 2021). As servitization is neither a linear nor a purely logical process, this research advocates for further qualitative, processual case studies to develop midrange theories of cultural change (Rabetino et al., 2018). However, theories advance as their generalizations become more structured, their constructs more universal and their explanatory scope broader (Weick, 1989). Thus, expanding process studies with methods suited for causal explanations would benefit theory building and testing (Salonen, Zimmer, et al., 2021).

Configurational methods such as fuzzy-set qualitative comparative analysis embrace the causal complexity of contingencies between conceptually distinct factors inherent in cultural change (Ragin, 2008). Configurational case research can build on this research's findings to identify necessary and sufficient conditions across multiple change factors, organizational levels and contexts to explore alternative paths toward servitization culture (Lexutt, 2020; Salonen, Terho, et al., 2021; Soto Setzke et al., 2023). Specifically, this research encourages exploring configurations of individual and social constructs to identify paths of member-level change and inform actionable change agendas. On the contrary, interventionist logic reduces complexity by isolating causal links between change factors and outcomes in narrowly defined phenomena, typically within controlled settings (Pearl, 2009). While traditional experiments may be suitable for certain organizational and leadership behavior studies in servitization, the field's theoretical nascency and limited B2B sample sizes present significant challenges (Salonen, Zimmer, et al., 2021). Moreover, variance-based interventions are limited in capturing the dynamics of emergent change. Building on Schein's (1987, p. 27) argument that "one cannot understand a human system without trying to change it", this research advocates a process-oriented research strategy based on real-world interventions. Rather than testing static hypotheses, change interventions in servitizing organizations can create learning cycles to test, refine and develop midrange theories (Oliva, 2019). For example, if an intervention encounters unexpected resistance, researchers can refine existing knowledge on cognitive and behavioral barriers to servitization while developing theories about the factors that enable effective change.

Using action research to collect data by altering variables in ongoing change processes, intervention-based research offers a promising approach for advancing both theory and practice (Benoit et al., 2019; French & Bell, 1999). First, it allows for conceptualizing and testing configurational change paths by uncovering change managers' causal beliefs (Oliva, 2019; Salonen, Zimmer, et al., 2021). Second, researcher engagement with organizations may foster experiential learning cultures that are vital for servitization. In conclusion, configuration and intervention serve as complementary research strategies that bridge theory advancement and practical problem-solving, providing novel paths to address industrial and academic challenges of cultural change in servitization.

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