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Tensions in digital servitization through a paradox lens

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ABSTRACT

Two of the most disruptive changes in today's business markets are servitization and digitalization. Their increasing convergence into digital servitization leads to tensions both within and between organizations. The authors investigate such intra- and interorganizational tensions by applying a paradox theory lens. The study draws on 56 depth interviews and multiple site visits from two cases in the aerospace and maritime industries. Linked to the paradoxes of organizing, learning, belonging, and performing, eight tensions emerge from the findings. The intra-organizational tensions include digitally enabled control, digital upkeep, professional identity, and performance priorities. In turn, the interorganizational tensions comprise platform-based coopetition, information superabundance, organizational identity, and data utilization. For practitioners working with digital services, this study suggests an audit of tensions to inform continued formulations of a mitigation strategy.

1. Introduction

Tensions are coexisting, contradictory, interrelated differences, within and between organizations, that reflect conflicting, non-combinable viewpoints or intentions (Fang, Chang, & Peng, 2011; Öberg, Dahlin, & Pesämaa, 2020). When organizations or interorganizational networks change, it creates new pressures to balance stability against that change, which can create tensions for actors who experience this contradiction (Lewis, 2000; Smith & Lewis, 2011). Tensions represent discomfort generated by ambiguity, due to various sources, such as divergent communications, inaccurate planning, or incongruity in actors' aims (Tóth, Peters, Pressey, & Johnston, 2018). Typical business-related tensions include profitability versus growth or looking at the whole of the company versus its parts.

Two of the most disruptive changes in today's business markets are servitization and digitalization (Tronvoll, Sklyar, Sörhammar, & Kowalkowski, 2020). These interrelated transformations contribute to blurred industry boundaries and more dynamic environments, which evoke tensions among actors. Servitization is the strategic shift in which manufacturing firms increasingly pursue competitive advantages by offering innovative combinations of industrial goods and services (Raddats, Baines, Burton, Story, & Zolkiewski, 2016). Digitalization refers to uses of digital technologies to alter sociotechnical structures, beyond technical processes (Svahn, Mathiassen, & Lindgren, 2017). It is enabled by equipping physical objects with sensors and analyzing data streams from connected products, such that manufacturers can offer complementary digital services (Bilgeri, Fleisch, Gebauer, & Wortmann, 2019). Merging goods, services, and software-based offerings is an emerging area within the servitization domain. Such *digital servitization* (Hsuan, Jovanovic, & Clemente, 2021) entails the utilization of digital technologies for transformational processes from a product-centric to a service-centric business model (Sklyar, Kowalkowski, Tronvoll, & Sörhammar, 2019).

The migration from product-centric approaches toward integrated product–service offerings already can create internal tensions; when services have a digital base, the incorporation of digital technologies prompts even more challenges. Raddats, Kowalkowski, Benedettini, Burton, and Gebauer (2019) identify digital servitization as a key

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research priority; Baines et al. (2017) highlight the need to understand the dynamic technological shifts in servitization for both internal (intra-organizational) and external (interorganizational) contexts. Servitization research tends to focus on intra-organizational issues, because new functions introduced into organizations often jeopardize the existing product-oriented approaches (e.g., Kohtamäki et al., 2021; Raddats et al., 2019). In acknowledging that the shift from product- or service-centered practice to a digital and software-oriented approach triggers even more substantial and comprehensive tensions (Svahn et al., 2017), we posit that the new tensions extend beyond the organization. This additional interorganizational complexity may explain why digital initiatives often fail, despite good intentions and favorable conditions (Gebauer, Fleisch, Lamprecht, & Wortmann, 2020). Against this backdrop, our study investigates intra- and interorganizational tensions associated with digital servitization.

Prior research on tensions has investigated how organizational values and power relations shift (Greenwood & Hinings, 1996), innovation contexts (Andriopoulos & Lewis, 2010), and tensions between efficiency and effectiveness in servitization (Kohtamäki et al., 2021). Yet less is known about interorganizational tensions and how they can be handled. Consequently, it is necessary to understand both intra- and interorganizational adjustments when manufacturers pursue digital servitization. In response to calls for more research in this area (Lenka, Parida, Sjödin, & Wincent, 2018; Niesten & Stefan, 2019), we adopt a paradox lens to investigate tensions associated with digital servitization. By capturing “dark side” aspects, we aim to extend academic discussions of servitization while also broadening knowledge bases pertaining to business-to-business tensions. To that end, we establish two main research questions:

1. What paradoxical tensions arise for manufacturing when pursuing digital servitization?

2. How can a paradox lens support the investigation and conceptualization of tensions that occur during digital servitization?

In turn, our study helps clarify paradoxical tensions by proposing a framework involving both intra- and interorganizational settings and considering the impact of the identified tensions on digital servitization. With the proposed framework, we aim to offer valuable contributions to research on servitization and digitalization in business networks. To gather detailed insights into the tensions associated with digital servitization—a complex phenomenon in need of theoretical development (Zeithaml et al., 2020)—we conducted a qualitative, in-depth study of two cases (from the aerospace and maritime industries). This allowed for the higher external validity and more robust contributions in comparison to a single-case study (Goffin, Åhlström, Bianchi, & Richtnér, 2019; Yin, 2009). Addressing the study's aim, we leverage a rich data set of 56 semi-structured interviews and multiple site visits.

The study is structured as follows. In the next section, we present a brief overview of servitization, as well as of tensions through a paradox theory lens. Then we provide a review of existing research on digital servitization. After describing the methodology and findings, we discuss the identified tensions in more detail. Finally, the conclusions include a discussion of the implications for managers.

2. Conceptual background

2.1. Servitization and tensions

Manufacturing firms increasingly offer services and solutions to differentiate their offerings and sustain their profitability (Raddats et al., 2019; Worm, Bharadwaj, Ulaga, & Reinartz, 2017). Typically, companies expand their service portfolio, from basic, product-oriented services toward more advanced, process-oriented ones (Oliva & Kallenberg, 2003). Throughout servitization, manufacturers still maintain their established base of capital goods, as a unique resource they can leverage (Wise & Baumgartner, 1999). Many studies point to the challenges associated with such pursuits of a servitization strategy (e.g., Opresnik & Taisch, 2015; Zhang & Banerji, 2017). For example, it can create tension, because during the process, manufacturing firms might increase their revenues but generate lower net profits (Gebauer, Fleisch, & Friedli, 2005; Neely, 2008). Another frequently noted tension entails the coexistence of product- and service-centric business models and logics, which demand new ways of thinking and can create resistance among traditional parts of the business. Not all servitization-related hurdles incite tensions though, which instead require contradictory, interrelated elements that exist simultaneously and persist over time. That is, some challenges can be handled without any noteworthy tension, and some dilemmas that feature both advantages and disadvantages (Smith & Lewis, 2011)—such as whether to define a clear service strategy or initiate relationship marketing (Gebauer et al., 2005)—may be delayed in time, without sparking tensions.

To varying degrees, servitization involves the reconfiguration of a firm's resources, capabilities, organizational structures, and network relationships (Kowalkowski & Ulaga, 2017). For example, a service-centric business model differs from a product-centric model, in that it involves greater responsibility for customers' overall value creation. In this context, success depends not on the number of products sold or hours billed but on the outcomes for the customer, such as guaranteeing a specified level of availability or achieving an expected performance level. Considering the profound changes such a transformation entails, we expect it to incite paradoxical tensions that companies must manage to be successful.

2.2. Tensions through a paradox lens

Smith and Lewis's (2011) paradox lens offers a way to comprehend organizational tensions, in that it highlights oppositional demands and related challenges, so it also can help suggest integrated responses (Schad & Bansal, 2018) to tensions. According to the paradox lens, contradiction is inherent and can be a powerful source of enhanced performance, if harnessed effectively. Organizational tensions are diverse in shape and form and may culminate in conflict, such as when actors perceive barriers to the attainment of their own goals. Tensions also may manifest as verbal or nonverbal expressions of discomfort or as latent issues embedded in interactions; they typically can be divided into four core groups: organizing, learning, performing, and belonging (Smith & Lewis, 2011).

Organizing for change creates pressures to balance stability and change (Lewis, 2000) and differs from other tensions, in that it is grounded in seemingly contradictory arguments that persist over time (Johansen, 2018). For servitization, it entails product and service integration, as opposed to separate service and product organizations (Kohtamäki, Einola, & Rabetino, 2020). A common problem is a lack of coordination between product and service units, leading to customer confusion and internal tensions and uncertainty (Kowalkowski & Ulaga, 2017). *Learning* refers to creative tension that supports innovation and fosters new insights (Autio, 2005). A transition toward servitization causes tensions related to employees' skills and competences, such as reluctance to learn new service skills or fears about a loss of internal expertise (Burton et al., 2016), and difficulties in acquiring digitalization skills (Ardolino et al., 2018). In terms of *performing*, firms must balance constant improvements to a portfolio of service offerings to meet customer expectations against the need to exploit opportunities cost efficiently (Kowalkowski & Ulaga, 2017). This need to balance customization and efficiency may affect multiple intra-organizational functions and processes (Kohtamäki et al., 2020), such as those related to sales (Marcos-Cuevas, 2018). Finally, tensions may arise between individual action and group *belonging*, triggered by contradictions between present and future interests (Andriopoulos & Lewis, 2010). To maintain a sense of belonging, firms must develop service centricity while maintaining a product-centric engineering mindset and culture (Kohtamäki et al., 2020).

2.3. Complexities of digital servitization

Hsuan et al. (2021) characterize servitization as a system comprising product and service systems; a digital servitization system comprises servitization and software systems. Each system can be further decomposed into architectures and conceptualized in a polar fashion: product (modular versus integral), service (basic versus advanced), and software (open versus proprietary platforms). Digital servitization adds complexity to intra-organizational relationships, leading to increased coordination costs and risks within networks (Suppatvech, Godsell, & Day, 2019), conflicting authority structures that require a balance between an intra- or interorganizational focus (Tronvoll et al., 2020), and increasing demand for digital technologies or platforms to overcome various challenges (Eloranta & Turunen, 2016). Paschou, Rapaccini, Adrodegari, and Saccani (2020) regard digital servitization as the development process of new services and/or the improvement of current ones using digital technologies to enable novel (digital) business models, to find new approaches to co-creating value, as well as to gain knowledge from data, advance the firm's operational and environmental performance and create competitive advantage. Relevant types of digital service provision and technologies include but are not limited to remote monitoring (Grubic, 2014), predictive analytics (Ardolino et al., 2018), the utilization of big data (Opresnik & Taisch, 2015), distributed ledger (Kowalkowski, Bigdeli, & Baines, 2022), cloud technology, and other Internet of Things applications that support value-creation activities (Frank, Mendes, Ayala, & Ghezzi, 2019; Rymaszewska, Helo, & Gunasekaran, 2017).

Digital servitization also has inherent challenges that must be identified and handled properly, such as centralization versus decentralization (Sklyar et al., 2019) or cyber security (Frank et al., 2019). The planning and implementation of digital servitization produces clashes between digital and non-digital means and various interests in the business network (Kohtamäki, Parida, Oghazi, Gebauer, & Baines, 2019). Due to its increased complexity, digital servitization increases the governance-related challenge of balancing control and flexibility (Vendrell-Herrero, Bustinza, & Opazo-Basaez, 2021). Notably, business-to-business marketing scholars have called for consideration of potentially contradictory priorities (Chowdhury, Gruber, & Zolkiewski, 2016), which also are inherent to digital servitization. These aspects point to the need for a theoretical lens that can accommodate and explicate such collisions.

Coreynen, Matthyssens, and Van Bockhaven (2017) also distinguish routes to digital servitization that encompass back-end and front-end digitalization. Back-end digitalization relates to company-specific, intra-organizational aspects; front-end digitalization, which can rely on either open or proprietary software architecture (Hsuan et al., 2021), relates to interorganizational aspects, such as changing network relationships and configurations (Struyf, Galvani, Matthyssens, & Bocconcelli, 2021). As well as influencing existing relationships, digital servitization can enable new resource configurations (Story, Raddats, Burton, Zolkiewski, & Baines, 2017) that affect both intra- and interorganizational relationships (e.g., Parida, Oghazi, & Cedergren, 2016). Figure 1 presents a digital servitization framework that draws on Coreynen et al. (2017) in terms of low and high degrees of digitalization, though our emphasis is on digitally enhanced services and solutions, instead of different pathways to increase front- and back-end digitalization.

As a firm digitalizes its internal operations and processes, it shifts from a traditional model of basic service provision with low degrees of digitalization to industrialized servitization with an emphasis on automation and standardization (see also Kowalkowski & Ulaga, 2017). Having such an internal, digitalized backbone enables more cost-efficient provision of both basic and more advanced services. Commercial servitization, in contrast, focuses on digitalizing commercial interfaces and involvement of customers and other downstream actors. To achieve digital servitization, based on either open or proprietary

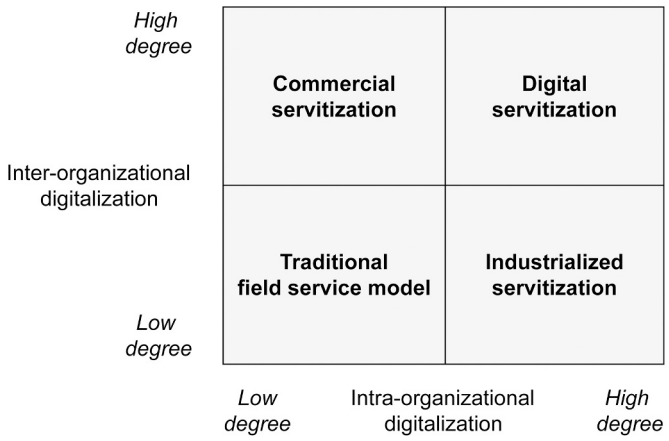

Fig. 1. Digital servitization framework.

software, high degrees of both front-end and back-end digitalization are required (e.g., Coreynen et al., 2017). Thus, from an *intra-organizational* perspective, digital servitization can enhance operational efficiency, facilitating closer integration between (central) back-end and (local) front-end units and between product and service units (Sklyar et al., 2019). From an *interorganizational* perspective, digital servitization can enable new forms of customer interaction and closer integration with network actors (Perks, Kowalkowski, Witell, & Gustafsson, 2017; Sklyar et al., 2019). Equally, as some accounts of digital servitization suggest, disruptions of existing arrangements for value creation and value capture may negatively affect interactions among actors (Klein, Biehl, & Friedli, 2018; Paiola & Gebauer, 2020; Vendrell-Herrero, Bustinza, Parry, & Georgantzis, 2017).

Despite the increased complexity introduced by digital servitization, few studies address the associated tensions, especially at interorganizational levels. As noted by recent studies (Kohtamäki et al., 2019, 2020; Tronvoll et al., 2020; Gebauer et al., 2020), extant literature offers brief or implicit accounts of these tensions; Tronvoll et al. (2020) and Gebauer, Paiola, Saccani, and Rapaccini (2021) explicitly call for further research that can support more effective management of digital servitization initiatives. We respond by applying a paradox lens to capture the multiple viewpoints, values, beliefs, and strategies that account for tensions (Schad & Bansal, 2018).

3. Method

Because digital servitization research is still nascent (Raddats et al., 2019), a qualitative case study approach (Bryman & Bell, 2015; Voss, Tsikriktsis, & Frohlich, 2002) allowed for the detailed insights into a complex phenomenon in need of theoretical development, namely, the tensions associated with digital servitization. To enhance the robustness of our empirical contributions, we conducted an in-depth, exploratory study of two cases (Yin, 2009).

3.1. Case selection and research setting

For the case selection, we used theoretical sampling (Bryman & Bell, 2015) with three criteria. First, to minimize extraneous variation in the data, we sought firms from established industries that confront similar institutional pressures, are dominated by a limited number of players, and encounter potential technological lock-ins. In these industries, digital servitization tensions are likely to be more apparent. Second, we selected firms pursuing digital servitization. Third, in line with the scope of the in-depth case studies, we identified firms that granted us comprehensive access to informants. On the basis of these sampling criteria and firmographic data on industry type and firm size (Arslanagic-Kalajdzic & Zabkar, 2017; Wang, Malthouse, Calder, & Uzunoglu,

2019), we selected one focal firm in the maritime industry and one focal firm in the aerospace industry, which supports in-depth case comparisons for theory building (e.g., Halinen & Törnroos, 2005; Miles & Huberman, 1994). Both firms are headquartered in Western Europe and work with multinational customers and suppliers.

In the aerospace industry, manufacturers of aircraft, engines, and components compete on price for asset sales. To overcome this pressure, manufacturers have begun to pursue new revenue streams in the service market, which traditionally involved aircraft maintenance, repair, and overhaul. Increasingly, incumbent maintenance firms face competition from manufacturers for digital service provision, such as engine health monitoring, fleet reliability management, and predicting equipment failure. The digital services have been offered on platforms of manufacturers (e.g., Airbus Skywise) or maintenance firms (e.g., Lufthansa Technik's Aviatar). Overall, digital servitization has had disruptive effects on the aerospace industry, altering the business focus within and between firms.

In the maritime industry, which was traditionally conservative, customer demand for digital services has rapidly increased due to new global safety rules (e.g., after the 2012 Costa Concordia accident), emissions and energy efficiency regulations (e.g., the EU Monitoring, Reporting and Verification Regulation), cyber security threats (e.g., NotPetya ransomware attack on A.P. Møller–Mærsk A/S), and volatile market conditions across customer segments. To meet these demands, digital services have focused on remote diagnostics, fuel and energy efficiency, motion forecasting and operations monitoring, condition-based monitoring, and cyber security. Similar to the aerospace industry, digital servitization has had major effects within and across firms (e.g., manufacturers, systems integrators, shipowners, operators).

3.2. Data collection

In-depth interviews are particularly effective for business-to-business marketing case studies (Lindgreen, Di Benedetto, & Beverland, 2021), so we collected the primary data mainly through semi-structured in-depth interviews, as well as during site visits (e.g., attending group meetings and internal workshops). We also gathered data from secondary sources such as corporate websites, financial reports, and internal company materials. We ensured ethical data management practices and protected the anonymity of the firms and individual respondents, which encouraged their openness around topics relevant to our research aim.

The semi-structured interview guide featured a funnel approach, such that general initial questions precede more specific questions (Patton, 2002). For example, we started by asking about the respondents' roles at the firm and in relation to digital servitization initiatives, as well as the contributions of internal units, customers, and partners in such initiatives. Then we moved on, but instead of a formalized list of questions for all respondents, we adapted some specific questions to the respondents' prior answers; if they mentioned tensions related to digital servitization, we sought additional information. For example, with an adapted laddering technique (Guenzi & Troilo, 2006), we prompted their reflections on each tension's potential explanations, antecedents, and consequences.

The respondents represent diverse positions (see Appendix), because the main sampling criterion was experience with digital servitization initiatives. Following meetings with top management of the focal firms, we identified the informants and interviewed them, during which we also asked them to suggest more respondents to allow for snowball sampling (Coleman, 1958). If more insights were deemed necessary, we re-interviewed informants. The interviews typically lasted 30–120 min (see Appendix) and were audio-recorded and transcribed. For the data collection during site visits, we captured them in field notes with no formal protocol, due to the casual nature of such direct observations (Yin, 2009). To reduce observer bias, the data were collected by several research team members, and the entire research team reviewed all field notes.

The data collection ended with saturation (i.e., no new insights appeared; Griffin, Price, Vojak, & Hoffman, 2014). Specifically, the number of data collection events was not predetermined, so we continued collecting primary data until (1) each case's empirical evidence became recurrent across interviews and site visits, and (2) no novel evidence emerged to aid data interpretation. Following these criteria, we achieved saturation after 20 interviews and 10 site visits in the aerospace case and after 36 interviews and 5 site visits in the maritime case. This volume of data collection events compares favorably to the saturation criteria suggested for business marketing case studies (e.g., Boldosova, 2020; Chowdhury et al., 2016; Lindgreen et al., 2021).

3.3. Data analysis

To analyze the collected data, we compared and interpreted the interview transcripts, write-ups of the field notes, and summaries of secondary data. The materials were reviewed toward convergence; for example, we used observational data to triangulate the interview data. To ensure investigator triangulation (Bryman & Bell, 2015), three research team members conducted independent, parallel analyses, then discussed the results with the rest of the team to identify the categories and themes (Raja, Chakkol, Johnson, & Beltagui, 2018).

The data coding was guided by our theoretical pre-understanding and, specifically, by the conceptual framework with four paradoxes (organizing, learning, belonging, and performing). First, an insight was assigned a code if it was deemed relevant and appeared in at least one primary source. The resulting 204 codes were analyzed to establish first-order categories, as long as they were corroborated by several primary sources and, if possible, from secondary sources; thus, 36 first-order categories were established across the two cases (see Figure 2).

Second, we developed overarching themes by comparing the 36 categories. Three research team members were involved in this process, which resembled systematic combining (Dubois & Gadde, 2002). We continuously moved between the empirical evidence and prior literature. Specifically, while our theoretical pre-understanding guided the coding, the subsequent analysis necessitated revisiting (1) the theory, (2) the data, and (3) the coding structure, and these steps were repeated multiple times. The eight resulting second-order themes aggregate the first-order categories, such that each theme specifies a distinct tension such as “platform-based coopetition” or “digitally enabled control” (Figure 2). Finally, following established guidelines for case studies (Lindgreen et al., 2021; Voss et al., 2002), we evaluated the research quality in terms of construct validity, internal validity, external validity, and reliability (see Table 1).

4. Findings

We present the study findings in the following order: We begin with tensions associated with the paradox of organizing, namely, platform-based coopetition and digitally enabled control. Then we outline the findings pertaining to the tensions of information superabundance and digital upkeep, associated with the paradox of learning. Next, in relation to the paradox of belonging, we present evidence pertaining to the tensions of organizational identity and professional identity. This section concludes with the tensions associated with the paradox of performing, namely, performance priorities and data utilization. We provide direct quotes from the respondents to illustrate these findings.

4.1. Paradox of organizing: Platform-based coopetition and digitally enabled control

For digital servitization, the paradox of organizing is associated with two tensions. The empirical evidence indicates that the tension of *platform-based coopetition* appears around data sharing for digital service provision. In the aerospace case, original equipment manufacturers traditionally supported the licensed network's service providers (which

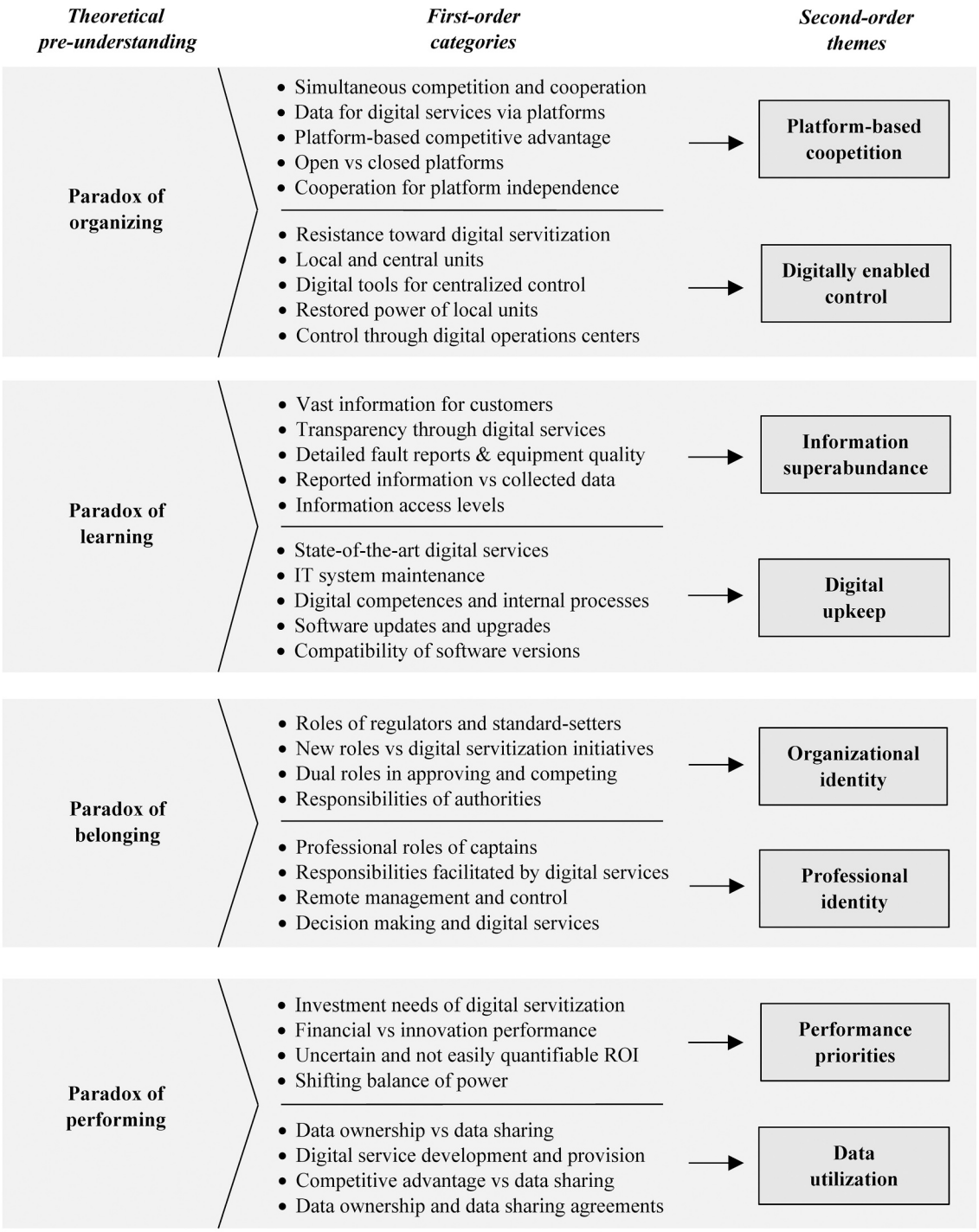

Fig. 2. Coding structure.

offer maintenance, repair, and overhaul services) with tools and intellectual property. However, these actors also competed for service contracts, and such competition intensified with digital servitization. On the one hand, the increased data sharing for digital service provision appeared beneficial for the entire network; for example, manufacturers leveraged data to develop predictive services, which lowered maintenance costs and increased aircraft reliability. On the other hand, manufacturers required the data to be uploaded to their platforms, essentially claiming ownership and thus raising concerns, even among customers:

> "We [the airlines] are rather underway with the concept of an open platform, whereas the manufacturers are underway with a closed system, in which I even have to pay for the discoveries of my data.… There are many airlines—not all but many—that do not want to let the dependency on the manufacturer increase too much." (Chief Operating Officer, formerly at Cargo Airline; aerospace case).

Service providers had negative perceptions of such platforms, because they believed that this platform-based "data monopoly" provided manufacturers with strong advantages in the competition for digital service contracts. To resolve this tension, independent platforms (e.g., Aviatar) were created through cooperation agreements, which

Table 1
Quality of the research process (adapted from Lindgreen et al., 2021; Voss et al., 2002).

Design Test	Case Study Tactics	Operationalization
Construct validity	Triangulation	Data sources (e.g., multiple respondents contributing insights), data collection strategies (e.g., multiple methods to gather empirical evidence), several researchers analyzing the data to achieve investigator convergence.
	Chain of evidence	Rich set of interview quotes; data collection details in the case study database.
Internal validity	Pattern matching	Conducting analysis across two cases.
	Type of data	The phenomenon is grounded in the collected rich data.
	Triangulation	Discussing the findings with respondents and peers.
External validity	Replication logic	A detailed description of the context for each case; situating cases within their respective context.
	Research methods	A semi-structured interview guide, a database for the gathered empirical materials, and pre-set approach for data analysis.
	Type of data	Gathering rich empirical materials.
Reliability	Interview protocol	Developing a semi-structured interview guide.
	Conceptualizations	The conceptual framework based on prior literature provides theoretical pre-understanding of the phenomenon for the data analysis.
	Case study database	NVivo case study database for data collection and analysis.
	Triangulation	Secondary data.

enabled the involved parties to upload data while maintaining their ownership. Both manufacturers and service providers thus could offer digital services through the same platform, on more equal terms.

The paradox of organizing is also associated with a *digitally enabled control* tension, arising during the implementation of digital servitization initiatives. In the maritime case, the firm's local (country-level) units traditionally owned relationships with customers and partners and, hence, exercised substantial independence in their strategic and operational decision-making. However, to develop and provide digital services, central units required direct access to the locally collected data, substantially reducing the local units' independence. The local units strongly resisted digital servitization initiatives, so to overcome this resistance, management altered the firm's organizational structure:

> "Previously, there was a lot of power in each country, and every managing director in the country had a lot to say about how the business was conducted there. Now, the power has shifted to the global business units, so it's [the central organization] that determines how a country will operate." (Vice President, Head of Global Services; maritime case).

Altering the organizational structure was possible with the assistance of novel digital tools, such as a ticket management system (i.e., all service support cases received a "ticket" that would be handled centrally) that enabled global access to the data previously available only at the local level. In addition, some degree of control was returned to the local units, with the goal of enhancing customer relationships. Nevertheless, centralized control was largely maintained through digital operations centers, established to streamline data access.

4.2. Paradox of learning: Information superabundance and digital upkeep

Within the paradox of learning, empirical evidence indicates that the tension of *information superabundance* arose around the increasingly vast information available to customers, perceived by our respondents as both "a blessing and a curse." Enabled by real-time connectivity, the firm in the maritime case offered its customers detailed reports within its digital service offerings that showcased the firm's advanced data collection and analysis capability—an important selling point for its digital services. To demonstrate the transparency of operations, every fault in the firm's equipment also typically was documented. Yet this detailed information damaged customers' perceptions of equipment quality, so to manage this tension, the firm learned to balance what was technically possible against what was manageable. It still collected data about equipment faults but removed this information from the customer reports, regardless of the decreased transparency.

In a similar vein, cyber security concerns in the maritime case prompted customer requests for access to raw data. If the customers were to transform such data into information, their need for some digital services could disappear, which would threaten the firm's business. To manage this tension, it introduced "dashboard views" with multiple levels of access to the information, as part of its digital service offerings. In turn, the firm learned how to provide sufficient information to meet customers' needs without revealing raw data:

"We are talking about [giving] customers access to raw data so they can do their own analytics.… The idea was that we want to share everything. And then some people want to step back because customers might not need us if they had access to everything. So maybe we need to start with different levels, like dashboard views." (Information Manager & Global Product Manager; maritime case).

The paradox of learning is also associated with the tension of *digital upkeep*, which emerged in relation to the maintenance of IT systems and software for digital service provision. In the maritime case, customers appeared to take it for granted that the firm would continuously update and upgrade its IT systems for uninterrupted operations and cyber security. Despite the crucial role of maintenance for such digital service provision, the firm traditionally had a non-digital focus, in contrast with customers' perspective. As a respondent admitted, "we tend to forget about such systems after installation, like we forget about motors after installing them." To manage this tension, the firm sought to develop digital competences and transform its internal processes, to learn how to operate like a mature digital company:

> "[Our customers] do not even think that the IT system might be down because it is not maintained; they just take it for granted. We don't realize that it takes a lot of work to maintain these systems. Look at these processes in mature IT companies like IBM—they know it; they have certificates, help desks, et cetera. All that, maybe on another scale, has to be transferred to our organization too." (Product Manager; maritime case).

Similarly, customers expected the firm to provide software updates and upgrades to guarantee that its digital services would remain state-of-the-art. Despite such expectations, customers wanted to avoid software incompatibility within the fleet and with partners. As a result, they often behaved conservatively, such as retaining previous software versions for several years, until the entire fleet could receive the same version. To overcome this tension, the firm had to learn how to balance support for legacy software against providing state-of-the-art digital services—again, by mimicking the operations of mature digital companies.

4.3. Paradox of belonging: Organizational identity and professional identity

The paradox of belonging is associated with the tensions of organizational identity and professional identity. The tension of *organizational identity* appeared mainly in relation to the roles of regulatory bodies and standard-setting organizations, associated with digital servitization. Due to the critical importance of passenger safety, strict and complex regulations in the aerospace industry traditionally had been ensured by external authorities. As an alternative to the costly activities required by such regulations (e.g., inspections), digital services could reduce costs

without risking safety. However, this shift would substantially diminish the authorities' roles, such that some national aviation authorities became uncooperative when it came to approving digital services. Several firms therefore began to collaborate around digital servitization initiatives to gain more power in their negotiations with aviation authorities:

> "The airlines are saying 'you [the firm] are big enough to get these things through with the authorities.'… And of course, I have the right to do it, but I need 20 airlines before I can go to the EASA [European Aviation Safety Agency] and tell them we would like to do [the maintenance records] electronically." (Head of Business Development Strategy, Business Unit Components; aerospace case).

In the maritime case, standard-setting organizations—that is, classification societies—traditionally approved products and services. Even as they retained this role, the classification societies increasingly launched digital services and began competing with incumbent service providers. Our respondents described the new dual role as "rather strange" and antithetical to a "constructive discussion." For example, when a classification society requested confidential details of the firm's digital service before approving it, this raised concerns within the firm:

> "These classification societies govern the safety of vessels, but they also want to be part of this digital business, and in many cases they're also now competitors when we seek their approval. That's tricky, because we'd like to go to them with our stuff to show that this is our algorithm … but when they're doing the same, it's difficult for us to give [them the information]." (Vice President, Digital Services; maritime case).

That is, the respondents suggested that the classification societies exploited the information they received to issue approvals but also to develop their own digital services. To manage this tension, the firm established cooperation with some selected classification societies on digital servitization initiatives, aiming to balance the negative effects of the societies' dual role with the opportunities to share knowledge around digital services.

The paradox of belonging also is associated with a *professional identity* tension, involving the roles of captains in relation to digital servitization. In the aerospace case, the captains' decision-making responsibilities (e.g., routing, fueling) were facilitated but also increasingly substituted by digital services. This transformation was perceived negatively by captains, but it gradually became accepted due to the positive effects on flight safety and emissions, as well as captains' ability to retain ultimate decision-making responsibility.

In the maritime case, the 2012 Costa Concordia accident prompted industry-wide concerns about the role of captains, who traditionally had been allowed to do "exactly what they wanted" in terms of vessel operations. To address such concerns, some digital services (e.g., fuel efficiency, navigation) tracked the vessels remotely, which the captains often regarded as a case of "Big Brother Watching You," reflecting their negative perceptions of their transformed role. To manage this tension, the firm continuously emphasized that captains remained the ultimate decision-makers:

> "[Our digital services] give advice, but it's very clear that this is advice; you [as a captain] are still in command of the vessel. If something doesn't seem right, pull out and maintain safe navigation. That's how it's always been, and it's how it always should be." (Integrated Operations Program Manager; maritime case).

4.4. Paradox of performing: Performance priorities and data utilization

The tension of *performance priorities* mainly involved financial versus innovation performance. In the aerospace case, the development and provision of digital services required substantial investments, yet the returns remained highly uncertain and difficult to quantify. In such conditions, only manufacturers and the largest service providers attracted enough customers to be able to leverage economies of scale:

> "We have different exemplars, new aircraft materials, digitalization—all areas in which an MRO [maintenance, repair, and overhaul service provider] must build new capabilities. This costs money; you must be able to cope with this level of investment, and there are not many players that can [do so]." (Manager, Corporate Product Management; aerospace case).

This tension was handled by balancing the financial and innovation performance associated with the digital servitization initiatives. For example, the service provider was able to adjust its investment decision-making, with the goal of achieving profitability of its digital service business. To address the substantial investment needs of digital servitization, the firm also launched a search for a partner that would financially support the relevant initiatives.

The paradox of performing also pertains to the tension of *data utilization*, linked to data ownership versus data sharing for digital servitization. In the maritime case, customers began requesting ownership of all the data collected from their vessels. The respondents perceived this demand as an obstacle to data sharing—and, by extension, to the development and provision of digital services that can derive business-critical information from the data:

> "More and more ship owners [i.e., customers] say they want to own the data. This could be [a barrier to development, and] if we can't get the data from other manufacturers' systems or from elsewhere in the ship, it might prevent us from doing things that we're doing at present." (Senior Vice President, Information & Control; maritime case).

Furthermore, some providers used data from different systems to create a complete picture of entire vessels (seen as a major competitive advantage), and customers requested that such data be shared with the providers' competitors too, for analytics or similar purposes. Threatened by losing their competitive advantage, the providers became more reluctant to participate in data sharing, thus negatively affecting digital servitization initiatives within the network. To handle this tension, some providers initiated agreements around joint data utilization, which improved data sharing and supported digital service provision.

5. Discussion

By identifying paradoxical tensions in digital servitization, this study enhances existing knowledge of how tensions unfold during digital servitization and their effects at inter- and intra-organizational levels. As a first contribution, we identify and categorize paradoxical tensions at inter- and intra-organizational levels. The findings reveal that firms experience multiple rationalities, beyond any one-size-fits-all approach, in utilizing digital technologies to transition from a product-centric to a service-centric business model (Coreynen et al., 2017; Sklyar et al., 2019). The varying levels of breadth and depth of advanced digital technologies' implementation entail different levels of complexities (Frank et al., 2019). This experience creates tensions arising from issues either within the organization or pervasively across interorganizational contexts that our study disentangles. From an organizational perspective, to achieve digital servitization (Figure 1), four tensions created by digital servitization affect intra-organizational concerns: digitally enabled control, digital upkeep, professional identity, and performance priorities. The other four tensions, manifested at the interorganizational level, are ubiquitous across firms' various business relationships: platform-based coopetition, information superabundance, organizational identity, and data utilization.

However, there is not always a clear boundary between intra- and interorganizational concentrations of paradoxical tensions. This is in line with the interplay between back- and front-end digital innovation

efforts (Coreynen et al., 2017; Frank et al., 2019), where internal and customer-facing issues are closely intertwined. Some tensions are nevertheless more prevalent at the intra-organizational level but can have indirect interorganizational effects. For instance, centralization versus decentralization poses a high-level strategic dilemma (Sklyar et al., 2019), in which digitally enabled control seems critical for digital servitization. As for the interorganizational level, we address the stated need for research on digitally enhanced management of multi-actor involvement (Raddats et al., 2019), the optimization of digitalization in buyer–supplier relationships (Schniederjans, Curado, & Khalajhedayati, 2020), and the impact of data-related issues (Guha & Kumar, 2018). Specifically, we explore and offer empirical evidence of paradoxical tensions in platform-based coopetition, information superabundance, organizational identity, and data utilization that are especially relevant in business-to-business contexts.

As a second contribution, we note a group of "digital native" tensions that are unlikely to develop in traditional servitization contexts, such as platform-based coopetition and its influence on decisions about who can access digital platforms, forms of access, and how such platforms get co-created (Perks et al., 2017), which in turn influence collaboration and the evolution of interfirm relationships. In contrast, another group of tensions in digital servitization settings is deeply rooted in traditional servitization contexts. For example, professional identity-related tensions may have an inherently digital core (e.g., "I'm not an IT guy, I'm a sailor"), but personal identity shifts also are evident in more traditional settings (Öberg, Grundström, & Jönsson, 2011). As hybrids of traditional and non-traditional forms, digitally intensified tensions may arise in more traditional settings (Fernandes, Spring, & Tarafdar, 2018) but seem exacerbated in digital servitization contexts. For example, extant literature describes control-related issues such as centralization versus decentralization (Raja et al., 2018); we demonstrate how this tension appears to intensify around digitally enabled control.

Paradox theory—and specifically the four categories of paradoxical tension outlined by Smith and Lewis (2011)—guided our exploration of tensions that arise from organizing for digital servitization, learning processes, pressures of belonging, and performance priorities. Figure 3 characterizes these tensions in terms of their intra- or interorganizational focus.

The impact areas in Figure 3 are not mutually exclusive; all of these tensions reflect the networked nature of digital servitization but manifest more strongly in one context or another. Thus, platform-based coopetition typically incites tensions in the business network, but we also note indirect intra-organizational effects, from the focal firm's perspective. The largely novel interorganizational tensions we identify can all be linked to digital servitization rather than more traditional forms of servitization that emphasize frontline employees (e.g., field service operations). Our findings provide empirical confirmation of Raddats et al.'s (2019) proposition that increased multi-actor involvement is critical to digital servitization. Similarly, existing studies stress how digital servitization can enhance a firm's competitiveness, but our data suggest that the outcomes depend on collaborative endeavors.

Platform-based coopetition, data utilization, digital upkeep, and information superabundance emerge as unique to digital servitization, highlighting the critical role of data sharing and analytics for digitalization (e.g., Guha & Kumar, 2018; Ransbotham & Kiron, 2017). Research attention has been called to address relevant platform-related

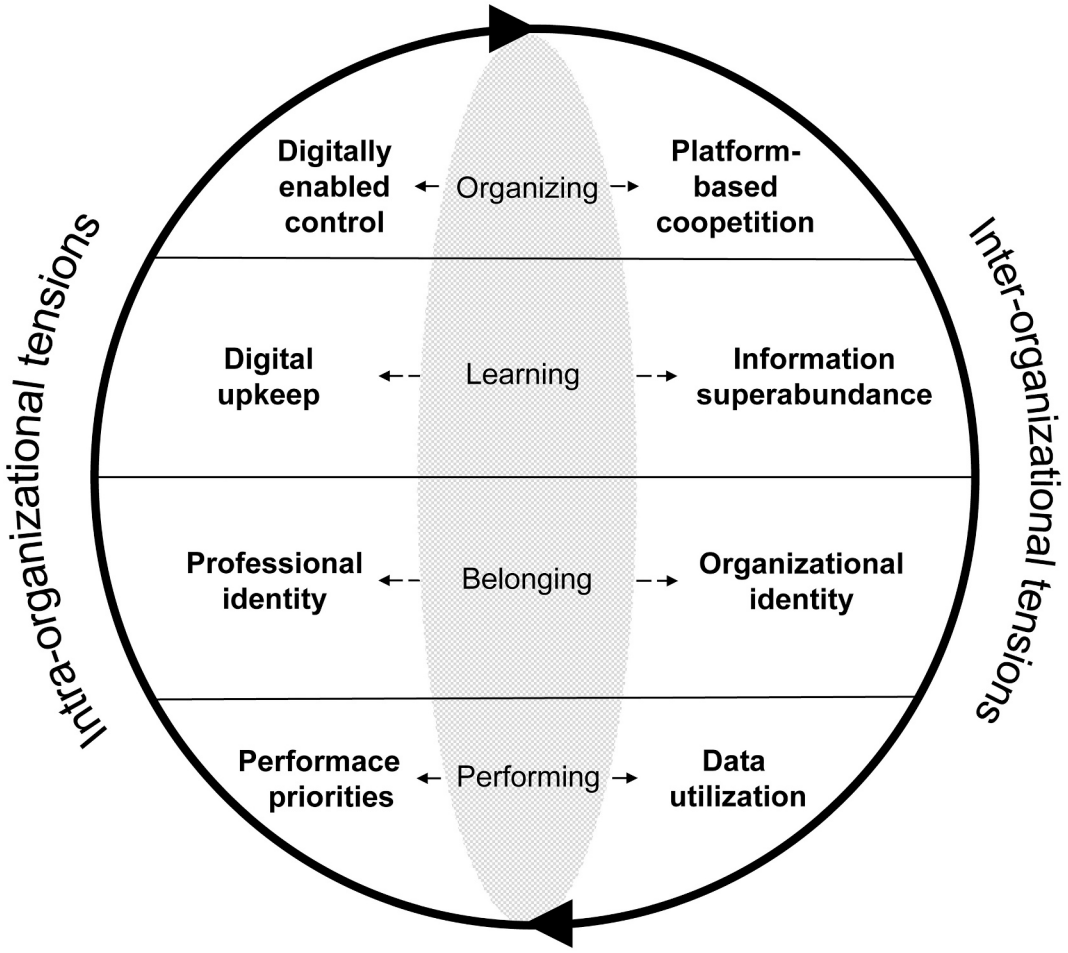

Fig. 3. Categories of paradoxical tensions and their impacts on digital servitization.

tensions, such as to balance openness and control or to manage simultaneous collaboration and competition (Rietveld & Schilling, 2021). In the maritime case, the tension around digitally enabled control stemmed from local units' relative loss of power, due to the increasing reliance on centrally managed data, but some degree of control later was reinstated for these local units, to reduce that tension. In addition, platform-based coopetition in the aerospace case evolved, in that the use of manufacturers' proprietary platforms caused power imbalances between service providers and manufacturers until open (independent) platforms were created. This allowed both service providers and manufacturers to manage their data and offer relevant services. Paradoxical tensions previously elaborated in more traditional servitization contexts include professional identity shifts, especially in terms of ambivalence (Lenka et al., 2018), and performance priorities such as innovation performance (Cenamor, Rönnberg Sjödin, & Parida, 2017). Our findings affirm that these tensions also arise with digital servitization but appear in more complex, highly networked, and sometimes intensified forms. For example, tensions around performance priorities exhibit even sharper competitive edges and more powerful pressures to meet innovation goals in digital contexts.

As presumed by previous studies (Burton et al., 2016; Sklyar et al., 2019), traditional tensions around control and organizational identity also intensify in digital servitization settings. Digitally enabled control might permit more precise performance tracking, but it also grants less scope for personal interpretation and thus affects power relations. Our study also illustrates how to overcome tension, as in the case of a professional identity shift. In the aerospace case, the tension around the captain's new role disappeared; it remained a source of tension in the maritime case, having arisen at a later stage. Thus, specific differences can be resolved and conflicting viewpoints reconciled, but the overarching tension (e.g., professional identity) may persist in different forms as the servitization journey continues. This finding is consistent with the notion of dynamic equilibrium (Smith & Lewis, 2011), reflecting the dynamic, persistent nature of paradoxical tensions and their ongoing, cyclical management.

We contend that the paradox theory categories must be broadened to capture more interorganizational aspects of change. As our data illustrate, each of the four paradoxical tensions proposed by Smith and Lewis (2011) are equally applicable within and across organizations, regardless of their roots, recognition, or resolutions. For example, the tension of belonging takes an intra-organizational form pertaining to the professional identity shift, as well as an interorganizational aspect, related to the networked nature of the relational contexts that involve organizational identity shifts. Organizational identity or affiliation can be linked to business-to-business interactions, in which partners display support for the affective stance expressed by their counterparts through a series of actions (Kaski, Niemi, & Pullins, 2018; Lindström & Sorjonen, 2013). Similarly, the paradoxical tension of learning includes network learning aspects (Gadde, Huemer, & Håkansson, 2003; Peters, Pressey, & Johnston, 2017), caused by the superabundance of data beyond the organization in a digitally enhanced network of interconnected actors. Organizing also features elements of orchestration-related tension, due to the networked nature of arranging and systemizing (Perks et al., 2017) in digital servitization, as demonstrated by the dynamic changes associated with platform-based coopetition.

Finally, tensions can be positive or negative, with implications for extensive change processes such as digital servitization. As Smith and Lewis (2011) emphasize, individuals can experience positive sentiments if exposed to the juxtaposition of contradictory tensions (cf. conventional dilemmas). For example, beyond frustrations, some tensions linked to digital servitization arouse positive sentiments like excitement and curiosity, such as among those working on strategy development for the aerospace case. This noteworthy duality may be a consequence of the simultaneous uncertainties and opportunities linked to digital servitization. Along with their potential to create conflicts within and among organizations, tensions can foster creativity that supports innovation (Autio, 2005). In the aerospace case, increased tensions between divisions eventually contributed to improved communication practices. Overall then, the proposed category scheme facilitates a deeper examination of the tensions associated with digital servitization.

6. Managerial implications

Prior research tends to highlight common servitization challenges or hurdles—and how to overcome them—without paying attention to the underlying tensions and their dynamics. From a paradox perspective, we argue that many servitization failures can be explained by firms' inability to cope with emergent tensions or to handle the ensuing contradictory demands, such as developing new service-centric capabilities without jeopardizing existing product-centric expertise. When firms pursue servitization, various tensions may arise between decision makers and organizational entities. Servitization generally conflicts with a more transactional and product-centric orientation; significant resistance from decision makers and organizational entities can arise if they view services as a threat to the company's profitability and core product business. Such conflicting viewpoints commonly co-exist in manufacturing firms across industries (Kowalkowski & Ulaga, 2017). Many servitization initiatives also fail to meet management expectations or cover the initial investment (Gebauer et al., 2005), leading to further tensions.

For practitioners working on digital servitization, our findings offer implications both for the present and the future. First, in terms of *present actions and thinking* (Jaworski, 2011), we invite managers to conduct an audit of tensions, rather than ignore or sweep them under the carpet. This point is illustrated as "Roots of the tension" and "Recognized tension" in Table 2, in which we contextualize the identified tensions and then describe them (in an order that corresponds to Figure 3). To capture a potential tension, distinguishing its roots from the actual tension is important; without mapping the context and any potential triggers, it would be challenging to understand the tension fully. Although we purposefully condense the contents of Table 2 for readability, we recommend outlining tensions in as much detail as possible. Especially when aimed at sensitive topics, such audits likely evoke resistance, so assigning champions with end-to-end responsibility for digital servitization initiatives might help overcome this challenge. The champions need strong stakeholder management skills, because collaboration is a key requirement for exploiting the benefits of digital servitization, and tensions are likely to appear both within and outside the firm (see Table 2).

Second, in terms of *future actions and thinking* (Jaworski, 2011), each tension identified during the audit can inform a planned mitigation strategy, as illustrated as "Responses to the tension" in Table 2. To avoid speculation, this table purposefully features past events; when practitioners plan an actual tension-handling strategy, their focus instead should be on the future, even if they also benchmark against previously (mis)managed tensions. By benchmarking, practitioners might realize that certain tensions are inherent to digital servitization. For example, the dual imperatives of digital servitization might involve a conscious balance between building a new digital business and digitalizing existing service operations. To address this and other tensions that may appear along the way, we suggest accumulating relevant organizational knowledge, establishing points of contact for discussing tensions, and developing skills for proactive tension-handling. Overall, firms should consider relevant response mechanisms (Table 2) rather than stay embroiled in tensions associated with digital servitization.

Finally, recognition of tensions—salient or latent—and their roots can foster creativity and opportunity-seeking behavior rather than defensiveness. As prior research shows (e.g., Smith & Lewis, 2011), paradoxical tensions demonstrate that companies and managers may need to handle multiple, competing agendas. Digital servitization spans organizational boundaries, internally (e.g., product design, manufacturing, marketing, service innovation, service operations,

Table 2
Digital servitization: Tensions, roots, and responses.

	Present Actions & Thinking		Future Actions & Thinking
	Roots of the tension	*Recognized tension*	*Responses to the tension*
Platform-based coopetition	Manufacturers and service providers cooperate and compete within the network. For digital service provision, the data need to be shared through the manufacturer's platform.	Increased data sharing benefits the entire network, whereas a platform-based "data monopoly" of manufacturers affects competition for digital service contracts.	Cooperation agreements to create independent platforms; manufacturers and service providers offer digital services on equal terms while maintaining data ownership.
Information superabundance	a) For transparency of operations, the manufacturer offers its customers information about equipment faults. b) Customers request access to all the raw data due to the increased cyber security concerns.	a) Although increasing transparency, the fault information damages the customer perceptions of the equipment quality. b) Customers' ability to transform the data into information threatens the digital service business.	a) Although it decreases transparency, fault information gets excluded from customer reports. b) Raw data are not revealed; instead, access levels to information are introduced within digital services.
Organizational identity	a) Digital services decrease the need for costly activities (e.g., inspections) mandated by aviation authorities. b) Traditionally setting industry standards, classification societies also become digital service providers.	a) To prevent the transformation of their traditional role, aviation authorities become uncooperative with approving digital services. b) A new role as a competitor around digital services is perceived as conflicting with the traditional role.	a) Firms collaborate around digital servitization to achieve more power in the negotiations with aviation authorities. b) To address the dual role, cooperation on digital servitization initiatives is established with some classification societies.
Data utilization	Customers request the ownership of all data collected from their vessels and that the data are shared among digital service providers.	Customers' data ownership threatens digital service provision; data sharing threatens the competitive advantage of individual providers.	Data utilization agreements are introduced between service providers to support digital service provision and improve data sharing.
Digitally enabled control	Central access to local data is needed for digital service development and provision; as a result, local units' independence is reduced.	Local units resist digital servitization, and management responds by altering organizational structure, enabled by novel digital tools.	Some degree of control is returned to the local units, but centralized control is still largely maintained via several digital operations centers.
Digital upkeep	Customers expect the manufacturer to continuously maintain IT systems and software for digital service provision.	The manufacturer's traditionally non-digital perspective on maintenance contradicts that of its customers.	The manufacturer develops digital competences and transforms internal processes to operate like mature digital firms.
Professional identity	The traditional role of captains changes when their decision-making responsibilities are facilitated or substituted by digital services.	Captains negatively perceive the role transformation caused by the increased usage of digital services.	Emphasizing the captains' role as the ultimate decision-makers, despite the continued widespread adoption of digital services.
Performance priorities	Substantial investment needs for digital service development and provision coexist with highly uncertain returns on such investments.	Only manufacturers and the largest service providers can leverage the economies of scale for digital servitization, shifting the network's power balance.	To balance financial and innovation performance, managing scalability issues and adjusting the investment decision-making.

software development) and externally (e.g., service and software partners, distributors, customers), and it typically involves various service and software systems, which means that managers in charge need resources and decision-making authority, but also in-depth knowledge and understanding of the intricate relationships among the different parts of the system. That is, managers need to acquire the right human resources, who understand the systemic and paradoxical nature of the system and can experience positive energy if exposed to competing tensions that persist, as in the case of conventional dilemmas. In both aerospace and maritime cases, the companies had to reorganize and recruit employees with new skillsets to handle the overall transformation and tensions. By recognizing the relevance of paradoxical thinking, managers may be able to find the right strategy and approach to recruit personnel with the right competences and harness their creative potential.

7. Limitations and further research

Drawing on paradox theory, we have identified eight tensions associated with digital servitization. Our study is based on two distinct cases—one in the aerospace industry and another in the maritime industry—but additional tensions might be uncovered by exploring other contexts. For example, we do not address the perspective of small- and medium-sized enterprises, and tensions that appear in this relevant context could be of interest. Furthermore, though our findings suggest responses to each of the identified tensions, their relative importance and prioritization remain to be examined. To this end, a more extensive application of the paradox theory framework might be effective, in that it also could provide a contribution to paradox theory itself. In contrast, our study aimed to contribute to research on digital servitization in business networks, using paradox theory as a theoretical lens. Other theoretical lenses, such as a strategic ambidexterity perspective (i.e., firms' ability to align demands and simultaneously exploit and explore; Bustinza, Vendrell-Herrero, & Gomes, 2020), also might be applicable, especially to study organizational learning processes (Cunha, Bednarek, & Smith, 2019), as required for digital servitization and related tensions.

The studied aerospace case highlights the increasing importance of digital condition monitoring (to reduce ground times and repair aircraft faster), aircraft heath monitoring (to plan removals and repair), reliability management (to improve aircraft reliability in service), fault analytics (to identify the source of errors), digital data analytic devices, as well as platforms. In a similar vein, the maritime case points toward the importance of remote monitoring, cloud, cyber security, big data, real-time connectivity, and platforms. However, considering advances in digitally supported products, further research should address unexplored opportunities for manufacturers (e.g., Gebauer et al., 2021; Svahn et al., 2017) and the roles of different actors in data-related processes (Zwitter, 2014) pertaining to digital servitization. For example, the rapid and ubiquitous rise of artificial intelligence (AI) warrants investigation of the associated tensions. Finally, future research might aim to operationalize the tensions and their antecedents, effects, and moderators, as well as mitigation tactics. Some insights in this regard emerge from our exploratory study, but a quantitative approach could shed more light on the tensions associated with digital servitization.

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Declaration of Competing Interest

None.

Appendix A. Interviews: Maritime and aerospace cases

Informant's position	Interview duration (hours and minutes)
Maritime case	
Analyst (Customer Service), two informants	01:12; 02:08
Business Development, Global Service	00:30; 01:00
Executive Business Unit Manager	00:54
Global Product & Portfolio Manager (Digital Solutions)	01:28
Global Sales & Business Development	01:42
Global Technical Support Manager	01:30; 01:00
Global Technical Support Manager	01:49
Information Manager & Global Product Manager	02:33
Integrated Operations Program Manager	01:28
New Energy Efficiency Manager	01:35
Product Manager	00:53
Project Manager	00:23
Project Manager	01:47
Sales Engineer (IT)	00:30
Senior Vice President (Collaborative Operations)	01:08; 01:27; 03:30; 00:30
Senior Vice President (Customer Segment)	01:54
Senior Vice President (Global Operations)	01:39
Senior Vice President (Information & Control)	01:24
Service Manager	01:01; 00:13
Service Manager (Local Region)	01:26
Service Sales Manager Merchant	00:30
Technical Advisor	01:20
Technology Manager	00:23
Vice President (Customer Segment)	01:30; 01:00
Vice President (Digital Services)	01:08; 01:00; 03:20
Vice President (Head of Global Services)	01:08; 01:38
Vice President (Region)	01:41
Vice President (Service)	01:41
Aerospace case	
Senior Vice President (Fleet Management, Airline)	01:02
Chief Executive Officer	01:05
Senior Vice President (Business Unit Engines)	00:59
Senior Vice President (Business Unit Base Maintenance)	00:54
Vice President (Sales)	01:12
Vice President (Purchasing)	01:28
Commercial Director (Business Unit Engines)	00:41
Head of Corporate Strategy	01:29
Team Lead (Engineering Services)	01:29
Head of Business Development Strategy (Business Unit Components)	01:13
Manager (Alliance Function), three informants	00:51; 01:23; 01:23
Manager (Corporate Product Management), two informants	01:20; 00:58
Manager (Repair Services Business Unit Engines)	01:04
Manager (Procurement)	01:09
Chief Operating Officer (former position at Cargo Airline)	01:07
Manager (Predictive Maintenance, Airline)	00:58
Senior Director (Engineering, Airline)	01:15
Director (Strategy Development, Airline)	01:14
Project Leader (Predictive Maintenance Implementation, Airline)	01:15

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