Introducing smart services: requirements and interconnections in multi-actor cooperation

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Abstract

Purpose – Smart services have gained attention both among academics and practitioners, but manufacturing firms struggle in getting their new smart services extensively adopted by customers, employees and distributors. The purpose of this paper is to identify and analyse the requirements of different actors and the interconnectedness between their requirements in introducing smart services.

Design/methodology/approach – An embedded single-case study was conducted with a manufacturing firm and its network, including its sales and service personnel, customers and external salespeople. Data were collected via 30 in-depth interviews.

Findings – The paper advances the multi-actor perspective by identifying the requirements of key actors for introducing smart services. These requirements were divided into eight categories: value of smart services, reliability of smart services, competence for smart services, data security and management, attitude towards services, reliance, knowledge of installed base of equipment and services and service reputation. The findings reveal the interconnectedness of different actors' requirements for introducing new smart services and how discussion and relationships between actors affected their requirements.

Practical implications – The findings represent a comprehensive template of requirements, as well as mapping the interconnectedness of actors' requirements, serving as a practical guideline for managers.

Originality/value – This study characterises the introduction of smart services as a multi-dimensional, interconnected effort by manufacturing firms and their networks. It shows that service introduction cannot be viewed as manufacturer's development task or customers' adoption decision only. Propositions are offered on how multiple actors' viewpoints can be combined to achieve success in introducing smart services.

Keywords Smart services, Servitisation, Industrial services, Service introduction, Interconnectedness

Paper type Research paper

1. Introduction

Manufacturing firms with service-oriented business models have explored various ways to add additional revenue streams and enhance product and service business through information and communication technologies (ICTs) (Opresnik and Taisch, 2015). The increased use of ICTs and data analytics has enabled manufacturing firms to enhance the value of their existing services, such as repair and maintenance, and to develop new services, such as operation optimisation and digital technical analyses (Lerch and Gotsch, 2015; Cenamor *et al.*, 2017; Matthyssens, 2019). The so-called smart services are a key outcome of this trajectory. The digitalisation in services opens the business relationships to complex interaction

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patterns between different internal and external actors, thereby essentially differing from traditional encounter-centric support services (Ciasullo *et al.*, 2021). Smart services are activities that the supplier carries out on behalf of the customer by collecting and analysing data facilitated by intelligent technical systems and products (e.g. machines equipped with sensors or telematics) to enable efficient operation and optimisation (Klein *et al.*, 2018; Stöhr *et al.*, 2018). Service value in smart services emerges in novel ways compared to traditional industrial services and requires new kind of thinking and information sharing in the supplier-customer relationship (Kamp *et al.*, 2022; Momeni and Martinsuo, 2018).

While digital servitisation creates value for all actors through close and long-term relationships, it also brings firms to an unknown territory (Kamalaldin *et al.*, 2020). Manufacturers need to take the risk of market failure (Reim *et al.*, 2019) and may be less confident about their capabilities to profit from digital servitisation (Coreynen *et al.*, 2017). Hence, studies have demonstrated that smart services fail more often than traditional products and services during their introduction to the market (Kampker *et al.*, 2018). Introducing smart services involves multiple internal and external actors who might have different perceptions about the new services and their benefits and drawbacks. These actors face different challenges in their attempt to make the introduction of smart services fluent. That is, firms invest resources to develop new smart services that fail to become extensively adopted (Korper *et al.*, 2021) by firms' customers, employees or partners, such as distributors. Capturing business value from new smart services may require additional actions from the supplier (Kamp *et al.*, 2022).

This study concerns the introduction of smart services in multi-actor co-operation as part of manufacturing firms' service innovations. In this paper, introducing smart services is considered as the launch of the new smart services to the market (Kampker *et al.*, 2018). On the one hand, the criticality of collaboration with customers has been emphasised during new service development (Helkkula *et al.*, 2018) and several integration mechanisms are needed to enhance the co-creation of value (Bonamigo *et al.*, 2020; Jähi, 2020). On the other hand, some multi-actor studies on servitisation in general and service readiness, in particular, complement this view, by identifying the key parameters and practices that affect the adoption of services by salespeople (Kindström *et al.*, 2015), within the customer firm (Raddats *et al.*, 2017; Jähi, 2020; Vaittinen *et al.*, 2018) and among other firms involved in the service supply chain, such as distributors or retailers (Aminoff and Hakanen, 2018; Vaittinen and Martinsuo, 2018).

The present study addresses two research gaps in these research streams. Firstly, while advances in technologies have enabled firms to develop different smart services, their struggle in selling smart services reveals that offering smart services is not merely a technological innovation issue (Kamp *et al.*, 2022; Troisi *et al.*, 2020). The previous research has mainly explored the earlier phase of digital service innovation (i.e. new service development) (Raddats *et al.*, 2022), whereas the requirements of introducing smart services, especially in manufacturing settings, remain under-investigated (Kampker *et al.*, 2018). In this field, the latter phase of service innovation is characterised by close relationships with customers, involvement of new internal and external actors such as salespeople or distributors, and possible conflicts and misalignments between the actors (Kindström *et al.*, 2015; Vaittinen *et al.*, 2018; Töytäri *et al.*, 2018). Despite the apparent role of these actors in new service introduction, there is a need for more understanding of their requirements, specifically towards the introduction of smart services. For example, traditional sales force may not be ready to sell smart services (Klein *et al.*, 2018) and requires specific training to overcome the new challenges (Grubic and Peppard, 2016).

Secondly, the literature mostly describes different actors' requirements of smart service business detached from other actors' requirements (Story *et al.*, 2017) or in a dyadic relationship, for example, in terms of the barriers for manufacturing firms (Klein *et al.*, 2018) or enablers of customers' readiness for new services generally (Vaittinen and Martinsuo, 2019). In practice, while customers may show some interest towards smart services, the manufacturing firm may still struggle with how the sales force can define and communicate service value (Grubic and Peppard, 2016), which, in turn, impacts how the customers assess the benefits and costs of services. Thus, the introduction of smart services requires a holistic consideration of different actors' requirements and alignments within the organisation and the business network (Töytäri *et al.*, 2018). Hence, exploring the requirements of each actor individually provides only partial understanding of smart service business. Moreover, manufacturers do not offer smart services in isolation from more traditional services. Studies that acknowledge the linkage between smart and traditional services (Sousa and da Silveira, 2017; Klein *et al.*, 2018) do not acknowledge the connectedness of requirements concerning them both. Thus, covering the requirements of both types of services in parallel instead of treating them separately merits further research.

To address these research gaps, this study uses a triadic approach to provide a context to better understand the inputs of these actors and the dynamic nature of their relationships (Andersson *et al.*, 2019; Wynstra *et al.*, 2015). In particular, we use the concept of interconnectedness (i.e. the mutual influence among interdependent actors in a network, Seno *et al.*, 2019) to investigate if and how actors' requirements are connected to each other. The primary research questions for this study are:

RQ1. What kinds of requirements do different actors have in introducing smart services? And

RQ2. How are the requirements of different actors interconnected when manufacturing firms introduce smart services?

The study focuses on a manufacturing firm and its key stakeholders in introducing industrial smart services, and thus excludes service introduction in the business-to-consumer or pure service company settings. This study contributes to research on smart services and service innovation by using an extensive embedded case study with four actor groups of a manufacturing firm to identify the requirements of different actors in the introduction phase to facilitate selling and purchasing smart services. It also extends the literature on smart services and service innovation by increasing understanding of the interconnectedness between requirements of different actors in introducing smart

services. For managers advancing smart services, the study provides a framework to analyse and manage the requirements of different actors as well as recommendations of how to facilitate introducing smart services successfully.

2. Theoretical background

2.1 Smart services

Advances in digital technologies have enabled manufacturing firms to change their business models by providing smart services to enhance maintenance, repair and operational services (e.g. remote monitoring) and to provide advanced analytics and integration to manufacturing supply chains (Allmendinger and Lombreglia, 2005; Ehret and Wirtz, 2017). Smart services differ from other types of industrial services, for example, in their high degree of automation and the ability to forecast machine failures and maintenance needs (Lerch and Gotsch, 2015). In particular, Internet of Things (IoT)-based services are often driven by production and process optimisation within customers' production systems (Kiel *et al.*, 2017). In addition to new offerings and processes, it is important to consider the structural and human resource implications of IoT-based services (Baines *et al.*, 2017; Troisi *et al.*, 2020). To use digital technologies, industrial firms need to develop digital capabilities such as processing, analysing and interpreting data from the installed base of equipment (Ardolino *et al.*, 2018).

Management of industrial services, in general, has been broadly covered in previous research (Gebauer and Friedli, 2005; Gitzel *et al.*, 2016; Ulaga and Reinartz, 2011), for example, through practical case studies on service innovation (Johansson *et al.*, 2019), co-creation of value with customers (Bonamigo *et al.*, 2020; Sjödin *et al.*, 2020) and servitisation enablers and barriers (Andrews *et al.*, 2018; Reim *et al.*, 2019). While attention is often directed at the distinction between basic and advanced services (Sousa and Da Silveira, 2017; Story *et al.*, 2017), digital technologies may bring novel features to both basic and advanced services. Several studies have confirmed the critical role of digital technologies in servitisation, opportunities raised by remote monitoring and interventions (Raddats *et al.*, 2022) and capabilities required to facilitate the use of digital data (Marcon *et al.*, 2022; Münch *et al.*, 2022).

The receptiveness of the customer for industrial services generally is taken for granted, but the readiness of the demand side for smart services has been challenged in several studies (Kamp *et al.*, 2022; Klein *et al.*, 2018; Momeni and Martinsuo, 2018). One difference between digitally enhanced or smart services and traditional industrial services is related to the use of digital data as a new component as part of products and services (Cenamor *et al.*, 2017). Further differences deal with the uncertainties regarding the operation, capabilities and relationships to facilitate the use of data (Klein *et al.*, 2018; Wünderlich *et al.*, 2015) and the needed changes in organisational culture and habits, ways of working and relationships (Vaittinen and Martinsuo, 2019).

2.2 Requirements of introducing smart services

Service innovations challenge existing business models and might create new markets for firms (Gustafsson *et al.*, 2020). The rapidly growing service innovation literature has defined service innovation as the process of developing new services and uses terms such as service innovation, service design and new service development interchangeably (Biemans *et al.*, 2016). This study uses the term service innovation to emphasise the outcome of a development process (e.g. a smart service) rather than how it was developed (Gustafsson *et al.*, 2020).

Previous studies have suggested different models of service innovation (Kelly and Storey, 2000; Lin and Hsieh, 2011). Typically, the models include the stages of developing a business strategy, generating ideas, concept development, business analysis, service development and testing and introduction. Mainstream service innovation studies have typically explored the early stages of the process (Goduscheit and Faullant, 2018; Lusch and Nambisan, 2015), including joint service development, value co-creation with customers (Helkkula *et al.*, 2018) and different customer involvement methods (Bonamigo *et al.*, 2020; Jähi, 2020). Regarding the latter stage of service innovation, namely, the full-scale launch of the new service to the market, suppliers need proper marketing plans, monitoring the customers' responses and internal employees' feedback (Lin and Hsieh, 2011). Although the importance of service introduction phase is acknowledged, it is still an insufficiently researched topic (Kampker *et al.*, 2018).

Another stream of research, close to service innovation and covering the introduction phase, pertains to service readiness. Building on the concept of technology readiness (i.e. individuals' willingness to adopt and use a technology, Parasuraman, 2000), business customers' service readiness has been defined and mapped as part of the service adoption. It complements technology and consumer-focused research by considering organisational culture and habits as an additional organisation-level readiness dimension when services are to be adopted (Vaittinen *et al.*, 2018). ICT-based service readiness, in particular, can be influenced by technological infrastructure and competence, perceived benefits and challenges (Aboelmaged, 2014), the relationship between the manufacturing firm and the customer organisation (Vaittinen *et al.*, 2018), past experience, industry trust and switching cost of service provider (Vize *et al.*, 2013). The technological aspect and the newness of many smart services to both customers and salespeople highlight the relevance of readiness in relation to smart services because technology-enabled services represent a weakly known territory with high uncertainty.

When introducing smart services, data security and value creation have been highlighted as key requirements. The adoption of services based on IoT is hindered by the possible threat to data security (Favoretto *et al.*, 2022; Ives *et al.*, 2016). This increased uncertainty might create higher adoption barriers (Kuester *et al.*, 2018). This naturally decreases customers' willingness to share data about their practices and production processes (Gitzel *et al.*, 2016). Loss of control over data exchange (Wünderlich *et al.*, 2015) and questions on data ownership (Porter and Heppelmann, 2014) have hindered the adoption of smart services by the customers and are among key requirements to consider during the introduction of smart services.

Moreover, perceived value in the context of what is given (costs) and what is received (benefits) affects the adoption of smart services (Jayashankar *et al.*, 2018) and causes requirements to their introduction. Empirical studies demonstrate that to succeed in introducing smart services, there is a need to convince salespeople (Vaittinen and Martinsuo, 2018). To improve smart service selling, salespeople must clearly understand the value created through these solutions (Classen and Friedli, 2021). Likewise, customers need to be certain about the benefits and reliability of such services and often merely services in general (Vaittinen *et al.*, 2018). While smart services can significantly affect customers' business processes (Story *et al.*, 2017), customers need to be convinced about the benefits that will accrue to them (and not only the manufacturing firm) (Brax and Jonsson, 2009). Challenges of understanding customers' needs and consequent development of value propositions and ineffective communication of the value of smart services have been identified as main barriers in smart service adoption (Brax and Jonsson, 2009; Grubic, 2014; Kamp *et al.*, 2022; Klein *et al.*, 2018). Two overlooked challenges in introducing smart services are bad service reputation of the manufacturing firm and insufficient knowledge of the installed base of equipment and related services by the customers (Klein *et al.*, 2018).

The previous studies in the industrial context have typically addressed the requirements of offering new services from the manufacturing firm's perspective, considering a manufacturing firm as one entity. Within the manufacturing firm, the lack of a clear strategic direction may cause insecurity and confusion at the operational level, for example, in sales and marketing functions (Lenka *et al.*, 2018). Role ambiguities (i.e. unclear expectations, responsibilities and demands) can create conflicts and confusion and dilute accountability (Lenka *et al.*, 2018; Sjödin *et al.*, 2016). The lack of capabilities or the mismatching of resources and capabilities can also hinder offering new services (Story *et al.*, 2017; Töytäri *et al.*, 2018). On the other hand, having service capabilities and experience in providing basic services could also facilitate offering new advanced services (Sousa and da Silveira, 2017; Story *et al.*, 2017). Such studies indicate that even within the manufacturing firm, there are multiple actors, each with their specific requirements for introducing new services.

There is a consensus on the importance of a customer's acceptance of new services and the critical role of salespeople in that process (Kindström *et al.*, 2015). To achieve benefit from digital technologies, both the supplier and customer need complementary digitalisation capabilities, relation-specific digital assets, digitally enabled knowledge-sharing routines and partnership governance (Kamalaldin *et al.*, 2020), and they require an alignment of the business models (Kohtamäki *et al.*, 2019; Wünderlich *et al.*, 2015). Previous research has covered how and through which capabilities, sales approaches and methods manufacturing firms can add new services into their portfolios and move from product sales to service sales. Selling services changes the sales process and requires new capabilities in manufacturing firms (Kindström *et al.*, 2015; Ulaga and Reinartz, 2011), such as value-based selling and use-based pricing (Töytäri *et al.*, 2011; Gebauer *et al.*, 2017) and shifting to selling service-oriented solutions (Hakanen and Jähi, 2021). There is a need to go beyond the manufacturing firm and for further research on the customer, salespeople and intermediaries' adoption of services (Vaittinen *et al.*, 2018; Vaittinen and Martinsuo, 2019).

2.3 Multi-actor perspective on service introduction

Previous studies on digital servitisation often explored the requirements of one actor (often the manufacturing firm) to identify the enablers and barriers of offering services (Classen and Friedli, 2021; Klein *et al.*, 2018; Lenka *et al.*, 2018; Sousa and da Silveira, 2017). Studies with a dyadic perspective mainly focused on operational and relational capabilities (Hasselblatt *et al.*, 2018; Kamalaldin *et al.*, 2020; Sjödin *et al.*, 2016). Some studies cover the external agents that sell services on the manufacturing firms' behalf (i.e. external salespeople). Aminoff and Hakanen's (2018) study of manufacturing firms and distributors revealed how servitisation implies new requirements for both manufacturing firms and distributors' operant resources: manufacturing firms need to develop relational ties and support distributors, and distributors need to develop relational ties and develop new solution sales, delivery and co-creation capabilities. Previous research tends to deal with services (generally) and advanced services (specifically) rather than smart services.

Additional requirements are caused by the digital enablers and ways of operating with smart services. Only a few studies have explained and resolved the cognitive barriers to offering smart services between firms (Klein *et al.*, 2018; Töytäri *et al.*, 2018). For instance, Klein *et al.* (2018) identified four factors hindering smart service business, including internal resources and capabilities, customer and information, value proposition and customer needs and adaptability. While these findings portray non-technical barriers for smart services, there is a need to increase knowledge on the early phase of introducing smart services and the requirements within the organisation and outside its boundaries (Vaittinen *et al.*, 2018). This is the first research gap that this study addresses.

In complex service businesses such as smart services, there is a need to go beyond dyadic interaction of customers and manufacturing firms to explore dynamic interactions among multiple actors (Alexander *et al.*, 2018). Smart services are typically designed by the manufacturing firms in collaboration with third parties, used by the customers in interaction with other solutions, delivered by the distributors, and operated either by the manufacturing firms, customers or partners (Ciasullo *et al.*, 2021). This complex setting makes the introduction of smart services challenging and requires an understanding of the motives, mindsets, perceptions and requirements of different actors and their interconnections.

In line with business marketing, purchasing and supply management literature (Håkansson *et al.*, 1999; Li and Choi, 2009; Vedel, 2016), a recent stream of research explores service triads where suppliers, intermediaries and customers are three key actors with specific roles (Andersson *et al.*, 2019; van Iwaarden and van der Valk, 2013; Wynstra *et al.*, 2015). Triad is the simplest network, and triadic settings reduce network complexity, thereby enabling industrial network analyses (Seno *et al.*, 2019). Service triad is different than other forms of triad due to the need for direct exchange with customers (Wynstra *et al.*, 2015). Previous research has studied different types of service triads, such as logistics and transport service triads

(Andersson *et al.*, 2019; Kovalevskaya *et al.*, 2021) or triads in an integrated solution business context (Cova *et al.*, 2021). For instance, Cova *et al.* (2021), in their study of focal nets in solution business, concluded that triads allow to analyse how focal firms and customers gain control over the relationships to provide a solution that fits both actors' requirements. Only a few studies explore a triadic structure in industrial service networks, which implies studying all three actors that are connected either directly or indirectly (e.g. Finne and Holmström, 2013).

This study takes a triadic, multi-actor approach to studying the introduction of smart services, and specifically assumes that different actors may have different, interconnected requirements when introducing smart services. Interconnectedness is the main feature of triads, and it implies either direct or indirect connection between actors who form a network (Vedel, 2016) and also connections between their relationships (Pardo and Michel, 2015). The triadic approach is not limited to analysing one triadic setting among independent entities, but it can involve multilayered triads (Kovalevskaya *et al.*, 2021), to investigate both cross-functional and inter-organisational relationships (Seno *et al.*, 2019).

Triads in introducing smart services may be quite different from other types of service triads due to their innovativeness and associated risks and uncertainties regarding the competences, processes and operations. Mutual trust, commitment and co-creation of value govern the relationships between actors in a triad (Cova *et al.*, 2021); it is not yet clear how the new smart services change these relationships and what the new requirements of actors are. This is the second research gap that this study addresses. We will use a case as an illustration of a triadic structure to further conceptualise two main topics: the requirements of different actors in introducing smart services and the interconnectedness of actors' requirements.

3. Research method

To develop understanding of the requirements of multiple actors in introducing smart services, a qualitative case study was designed pertaining to a manufacturing firm within its network (Yin, 2009). This research uses a triadic approach to explore the multi-actor cooperation in introducing smart services. Triadic approach is considered as a methodological choice to avoid excessive complexity of relationships in a larger network (Seno *et al.*, 2019). The triadic setting has been used in several marketing and operations studies to characterise the specific type of relationships in a network (Andersson *et al.*, 2019; Vedel, 2016).

To collect rich data in a real-life context, an embedded case study of four actor groups, namely, service managers and internal salespeople in the focal company, its external salespeople and customers (together forming a triad), was conducted. The focal company has an annual revenue of approximately €100m and approximately 500 employees. It offers complex systems and services to industrial customers. It operates in the engineering and manufacturing sector, and its offerings are tailored for each customer and sold globally. The company was selected based on the increased importance of services in its business, its extensive effort towards developing smart services, and its utilisation of both internal and external salespeople. The main smart services include 24/7 technical remote support, predictive maintenance and remote system upgrades. The firm also offers and develops more advanced smart services, such as data-based consulting services.

Data were collected through 30 interviews: six among service managers, nine among internal salespeople, seven among external salespeople and eight among customers. The service managers were responsible for service development and management inside the focal company. The internal salespeople included sales director, sales managers, service sales specialists and key account managers inside the case company. The external salespeople were partly agents selling the focal company's products and services and partly machine-manufacturing firms that complement their own offerings with the focal company's products and services. Table 1 depicts the overview of data collection. The common interview themes with all actor groups included the current state of the service portfolio, smart services and experiences with the focal company's services. In addition, some themes specific for each actor group were covered, such as the service portfolio and development with service managers, the selling process and the necessary skills of both sales groups, the relationship of the focal company with both external actor groups, service procurement and delivery with customers. All interviews were recorded and transcribed.

To ensure the trustworthiness of the research findings, several research quality procedures were followed (Lincoln and Guba, 1985). The interviewees were selected in collaboration with knowledgeable persons in the companies to find those informants who were actively involved in service introduction. Agreeing on confidentiality with the actors led to anonymising all data and very open information-sharing by the informants. Credibility was made certain through close collaboration with the company representatives, holding workshops and discussing the findings to enable member checking. The dependability of the research was assured by recording and transcribing interviews and thus increasing the traceability of the insights. To increase the transparency, excerpts from the interviews are used in the Findings section. To improve confirmability and eliminate any bias, the open-ended interview questions for some actor groups were reviewed by fellow researchers and company representatives. Subsequently, the findings were discussed within the research team. Finally, to ensure transferability, the focal company and research method were elaborated in the article.

Data analysis was conducted in four phases. Firstly, a thematic analysis was conducted to define the codes and to identify the main themes. Each actor group's transcriptions were first closely read and explored inductively to identify the requirements for introducing smart services. While the focus was on smart services, comments on other services were included when they were relevant to smart services. The results were tentative themes to be used for more detailed analysis. Secondly, the emerging themes were coded in parallel by the research team, which led to an initial template (Story *et al.*, 2017). The initial templates were discussed by the research team, and a template for application to the full data set was agreed upon (Story *et al.*, 2017). This was followed by

Table 1 Overview of the empirical data

	Service managers	Internal salespeople	External salespeople	Customers
Interviews/Interviewees	6/6	9/9	7/14	8/8
Average duration and range of interviews	78 min, 65–96 min	75 min, 38–100 min	50 min, 37–65 min	69 min, 37–98 min
Acronyms used in the findings	SM	IS	ES	C

identifying patterns among the requirements. This process was also influenced by the existing literature on smart services.

Through this analysis, the requirements were mapped to the overarching categories of requirements: service value, service reliability, competence, data security and management, reliance, attitude towards services, knowledge of installed base of equipment and services and service reputation. These categories helped to structure the findings and recognise the interconnections between the requirements of different actor groups. These categories were further grouped into two main dimensions: smart service specific requirements, which refers to those requirements that were directly related to the introduction of smart services, and general service requirements, which reflect the broader scope of the service business with relevance to smart services. Table 2 presents the entire data structure resulting from the data analysis.

The fourth phase of data analysis focused on identifying the interconnectedness of actors' requirements for introducing smart services. Interconnectedness was investigated as either a result of "resource interdependence" or a function of "actors" intentions and interpretations' in relation to each other (Vedel, 2016). The purpose of this phase was to move beyond individual actors' requirements and explore if and how the requirements are interconnected during smart service introduction. For instance, when some of the interviewees mentioned something related to cooperation with other actors, the statement was labelled as "resource interdependence" or when they stated their perceptions about the quality of basic services or service people's competences, it was labelled as "actors" intentions and interpretations'. Later, the context of the statement was reviewed to refine the analysis. Simple network charts (Figures 1–4) were developed to illustrate the interconnectedness and resolutions of actors' requirements when introducing smart services.

4. Findings

Sections 4.1 and 4.2 address *RQ1* and present general and specific service requirements of introducing smart services and how they were perceived by the four actor groups. These sections build a foundation for mapping the interconnections between the requirements. Section 4.3 answers *RQ2* and describes the interconnectedness of actors' requirements, including value of smart services, reliability of smart services, competence for smart services and data security and management.

4.1 General service requirements of introducing smart services

4.1.1 Attitude towards services

Attitude towards services concerns how different actors feel about the service business and the case company's services. Existing literature has identified the centrality of organisational culture and habits in increasing customer's service readiness (Vaittinen and Martinsuo, 2019). Our findings show that the attitudes of internal and external salespeople towards smart services are equally important requirements (as are those of customers) during service introduction. Within the organisation, some salespeople were uncomfortable discussing smart services or services in general. Our research complements Kindström *et al.* (2015) findings in that some salespeople had a stronger product-mindset and were unwilling to add service sales to their tasks. However, most salespeople understood the potential of service business and smart services.

In about half of the external salespeople interviews, future services were observed to have more emphasis on the smart services. In contrast, few interviewees mentioned that customers' service needs will remain similar, but they will need longer operating hours. Only a few interviewees described selling services proactively after the system sale, and some were reluctant to sell services during the system sales. The value of the services also divided opinions. A few stated that selling this supplier's services was unimportant since the volumes of this supplier's systems that they had sold were low. In contrast, some observed that offering certain services from this supplier would be good when they sell their own machines and this supplier's system so that they can provide similar service packages for both.

While customers, in general, admitted the importance of the existing smart services or the basic services from the focal company, the interviews with internal and external salespeople showed that some customers might consider the focal company's services to be rather expensive, which affects the customer's attitude towards services. This adds an aspect of future-oriented roadmap anticipation to service readiness (Vaittinen *et al.*, 2018), as one interviewee explained that the customer may gamble and tries to save some money while also potentially anticipating the future: "Well it never broke in the last two years, and I hardly ever used it (a smart service) so why do I need to spend all that money? But you will need to use it (a smart service) more in years three and four and five than you did in years one and two (ES7)". This further resonates with the earlier identified value capture paradox from a customer's perspective (Kamp *et al.*, 2022). A few of the external salespeople also highlighted how customers usually do not understand their service needs before they face it, no matter whether it is a lack of training or support when the production line stops.

4.1.2 Reliance

Service reliance relates to how different actors support one another in the process of offering smart services. The criticality of cross-functional and inter-organisational collaboration has been acknowledged in multiple servitisation studies, especially regarding service development and digital

Table 2 Data structure

First-order codes	Second-order categories	Dimensions
Internal salespeople	*Attitude towards services*	*General service requirements*
• **Being comfortable with services and proactive in selling services**	How different actors feel about the service business and the case company's services?	
External salespeople		
• **Being comfortable with services and proactive in selling services**		
Customers		
• **Being proactive in asking for services**		
• **Appreciating the focal company's service**		
Service managers	*Reliance*	
• **Data access to develop, pilot and deliver services**	How different actors support one another in the process of offering services?	
Internal salespeople		
• **Collaboration with the service unit during the sales process**		
External salespeople		
• **Support from the focal company**		
• **A positive reciprocal relationship and knowing the focal company's people**		
Customers		
• **Understanding impacts on dependency and relationship building**		
Internal salespeople	*Knowledge of installed base of equipment and services*	
• **Knowledge of service offering, service portfolio and prices**	How different actors know about different products and service offerings of the case company?	
• **Characteristics and values of certain services**		
External salespeople	How well they know the characteristics of the installed base of equipment and related services?	
• **Knowledge of service offering, service portfolio and prices**		
• **Characteristics and values of specific services**		
Customers		
• **Understanding links to existing systems and operation**		
Internal salespeople	*Service reputation*	
• **Reliability of basic services**	How different actors perceive the quality and reliability of existing services through the past experience?	
External salespeople		
• **Responsiveness in delivering spare parts and supporting customers**		
Customers		
• **Perceived service quality, expertise and reachability of on-site maintenance**		
Service managers	*Service value*	*Smart service specific requirements*
• **Value proposition communication (internally/to customers)**	How the benefits that a customer receives exceed the price paid for smart services, and what kind of value the actors perceive that they get from the services?	
• **Customer understanding of service value**		
Internal salespeople		
• **Understanding service value**		
• **Customers' understanding of service value**		
External salespeople		
• **Customers' understanding of their service needs**		
• **Customers should gamble less (i.e. could they go one more year without some service and save money)**		
Customers		
• **Understanding the offered service concept(s)**		
• **Understanding service value (benefits vs sacrifices)**		

(***continued***)

Table 2

First-order codes	Second-order categories	Dimensions
Internal salespeople	*Service reliability*	
• **Solution reliability**	How well the system maintains its promised level of quality over time?	
• **Service capabilities (resource availability and expertise)**		
External salespeople	How well smart service delivery fulfils the service promise in terms of responsiveness and quality of service delivery?	
• **Faster responses from the case company**		
• **Trust in service quality**		
Customers		
• **Solution reliability**		
• **Coping with technological change and development**		
Service managers	*Competence*	
• **Service capabilities (resource availability and expertise)**	How each actor has the right knowledge and skills regarding smart services?	
• **Customer service capabilities**		
Internal salespeople	How the focal company supports different actors in developing their competences?	
• **Salespeople competence**		
• **A clear service sales process and material**		
• **Training on service sales**		
Customers		
• **Focal company's service capability (resource availability and expertise)**		
Service managers	*Data security and management*	
• **Secure data access**	How well the data are secured, and that data management and ownership can be handled?	
• **Data management and ownership**		
Customers		
• **Data security**		

Figure 1 Value of smart services: the interconnectedness of actors' requirements

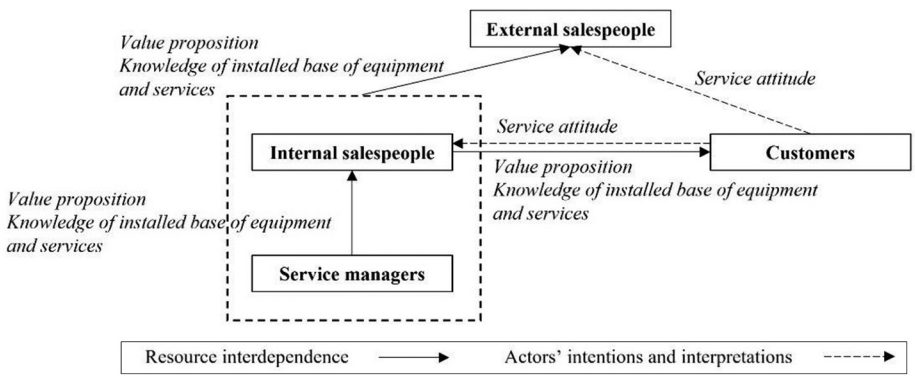


Figure 2 Reliability of smart services: the interconnectedness of actors' requirements

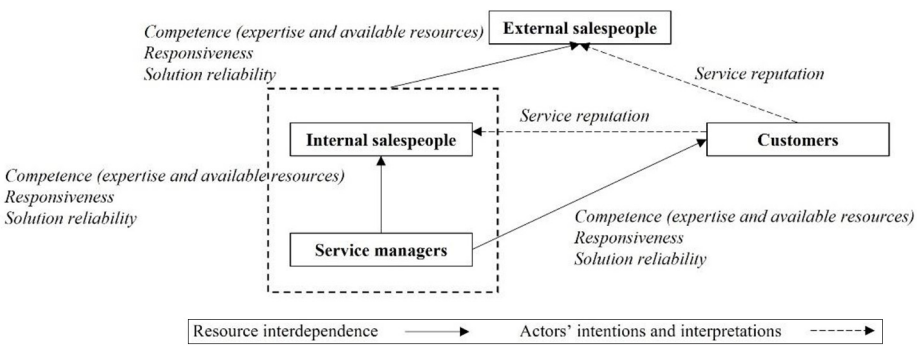


Figure 3 Competence for smart services: the interconnectedness of actors' requirements

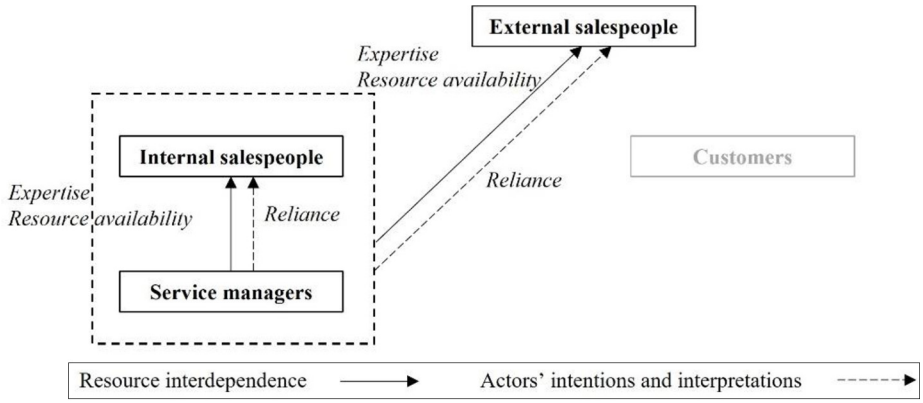
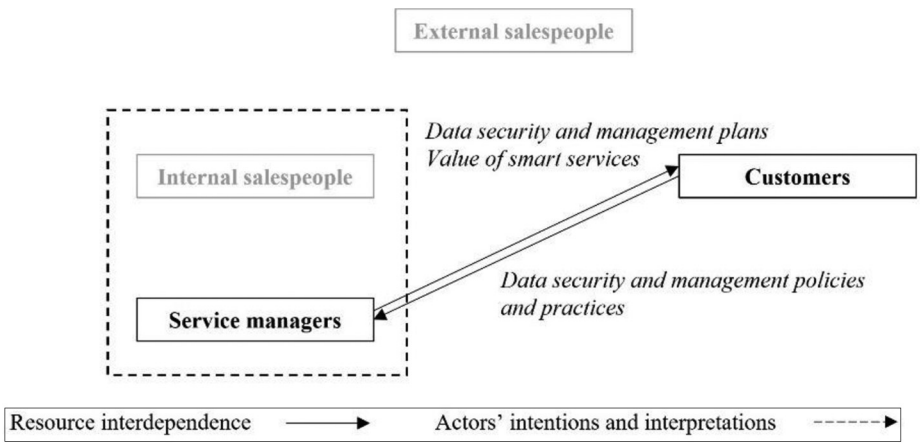


Figure 4 Data security and management: the interconnectedness of actors' requirements



capabilities (Sjödin *et al.*, 2020; Story *et al.*, 2017). Our findings extend the existing literature by specifying the requirements and expectations of each actor from their partners in the early phase of bringing smart services to the market. For service managers, the role of customers was critical in providing access to system data (also Gitzel *et al.*, 2016). To develop and pilot various smart services, customers should share data that were usually stored by them and only shared with the focal firm on demand, for example, during a maintenance shutdown. Respectively, online access to customers' system data was regarded as an essential requirement for delivering smart services in practice.

For internal salespeople, organisational support through cooperative activities with the service unit was considered important for all interviewees. However, interviews with salespeople did not highlight any specific expectations from external salespeople; the head of the sales unit explained the reason: "When our own salespeople have concerns regarding the reliability of smart services, they do not expect external salespeople to offer this type of service to customers (IS4)".

While the previous literature has often focused on supporting and enabling customers (Kamalaldin *et al.*, 2020), our findings illustrate the importance of supporting external salespeople during service introduction of new smart services. For external salespeople, the support they gained from the focal company played an important role. The interviewees were not as competent with the focal company's systems as they were with their own, so they needed support. They wanted to know more about the focal company's services and systems. When they were selling their systems and services, they hoped the focal company's support both with the designs and sales arguments. That is why they also hoped for more marketing efforts from the focal company (e.g. emails to customers and materials that could be left for customers when visiting them). External salespeople also wanted to know the situation at the focal company better (e.g. organisation and its changes as well as busyness).

Some customers emphasised dependency issues regarding smart services. New services could tie the customers closer to the focal firm, and as the product life cycles are rather long, it could affect the relationships between the parties. Furthermore, some customers advocated closer, partnership-based collaboration with the focal firm and smart services were regarded as one way to advance relationships in practice.

4.1.3 Knowledge of installed base of equipment and services

Knowledge of installed base of equipment and services relates to how different actors know about different products and service offerings of the focal company and how well they know

the characteristics of the installed base of equipment and related services. Insufficient knowledge of the installed base of equipment has been identified as one of the less-noticed barriers of offering smart services (Klein *et al.*, 2018). Our findings show that this knowledge acts as precondition, specially for internal and external salespeople. The internal salespeople often have deep knowledge about the product offering, but some salespeople were not well aware of the service portfolio and, in particular, smart services. A service sales specialist explained:

> We do not have that good sales information and the information we have is not distributed sufficiently well. So, it is complicated to exactly know what our company is offering, why we are offering these services, what the price is, how the customer benefits from it (IS1).

This knowledge becomes even more critical for external salespeople as separate entities. Interviewees highlighted the need for having deeper knowledge about what the focal company can offer to the customers, their characteristics, values, prices and contact people within the focal company related to those offerings.

4.1.4 Service reputation

Service reputation concerns how different actors perceive the quality and reliability of existing, more traditional services through the past experience. While requirements for smart services are not necessarily similar to the exiting services' requirements, we concur with Sousa and da Silveira (2017) in that some of them may be closely related. The experience with existing services was frequently mentioned by internal and external salespeople and customers in connection with smart services. The findings revealed that the attitudes of salespeople and customers towards smart services were affected by their perceptions of the reliability of basic services and the capabilities of service delivery people in general. For example, an interviewee explained the challenges in delivery of spare parts: "There was a case just recently that a service engineer went to the [customer's] site three times, but the spare parts were not sent there [from the central inventory]. Of course, it is quite annoying for the service engineer who is travelling there, but more importantly, it reduces our credibility in the eyes of the customer (IS4)."

4.2 Smart service specific requirements of introducing smart services

4.2.1 Value of smart services

Value of smart services concerns how the benefits that a customer receives exceed the price paid for smart services and what kind of value the actors perceive that they get from the services. While much of the literature discusses the necessity of communicating value of smart services to customers (Grubic, 2014; Kamp *et al.*, 2022; Klein *et al.*, 2018), this study finds that all actors required to be convinced about the benefits and value of new services. For service management and development personnel (service managers), convincing and communicating about the benefits of smart services appear to be a focal requirement. In the past, organisations have been strongly focused on machine selling, and introducing smart services required a different, more service-focused orientation from the entire organisation, including salespeople. Interviewees emphasised that smart services not only provide means to increase revenues but also to develop closer customer relationships, and thereby reinforce competitiveness. However, some service managers were cautious about using customer-originated data as a basis for novel services. They stressed that the focal firm must avoid the impression that they would make business using customers' data, as exemplified by one interviewee: "Customer should not get a feeling that they produce that data and [. . .] they do not benefit from that in any way (SM3)". Accordingly, introducing smart services called for discretion and communication with customers to clarify intentions, use of data and reciprocal benefits, particularly how the created value is shared between the parties.

On the other hand, understanding customer value plays a critical role regarding the confidence of salespeople in selling smart services (Classen and Friedli, 2021; Vaittinen and Martinsuo, 2019). A sales director explained: "I would say that most of the sales guys that we have today, if they would be seeing the benefits, they would be believing it, and they would be able to sell it (IS4)". In this regard, the most frequent reason for not selling smart services was related to the service offering. Smart services need to be productised in a way that it is clear what they are bringing to the customer and how. Some salespeople argued that smart services have not been systematically developed and productised.

Most customers interviewed for the study were generally interested in smart services, and the possible benefits that would accrue to them. However, the customers typically expressed that they need to understand how smart services would help them in practice. Accordingly, customers were interested but somewhat unaware of what would be the actual, novel service concepts, their relation to the installed base of equipment and the related benefits and sacrifices (e.g. price) for adopting the novel services.

4.2.2 Reliability of smart services

Reliability of smart services relates to how well the system maintains its promised level of quality over time and how well smart service delivery fulfils the service promise in terms of responsiveness and quality of service delivery. This study provides a different interpretation of reliability that has primarily been investigated from the customer's perspective (Vaittinen *et al.*, 2018) by addressing it also from internal and external salespeople perspectives. The salespeople needed to be confident about the reliability of the new services, the service delivery capabilities and the availability of service delivery resources. A key account manager explained:

> When you sell something you would like to see that it is delivered properly. That is also something that the service department needs to take care of that the quality of this service [a specific smart service] is constant and the delivery is on time and according to the description or specification (IS2).

The external salespeople wanted to know they can rely on the focal company. Specifically, the reliability of the production was highlighted as the key requirement for their customers, particularly in the future. Responsiveness was highlighted in over half of the interviews. In two, the focal company was seen as very responsive, whereas in several interviews more responsiveness was called for. Some saw that the focal company needs additional resources to answer queries in a timely fashion. As one interviewee expressed it: "That is also a main problem with [the case company]. It takes a very long time until

we get feedback. And we have to ask again, a second time (ES8)".

Most of the customers felt that the focal company's products are very reliable and, therefore would expect the same from the smart services. However, some customers were less confident in the focal company's services. Customers were cautious about the coming technological changes. Accordingly, customers placed expectations on the service providers and how they cope with technological development, including the smart services and their reliability.

4.2.3 Competence for smart services

Competence concerns how each actor has the right knowledge and skills regarding smart services and how the focal company supports different actors in developing their competences. Existing literature has identified several capabilities for advancing smart services in multi-actor settings at the business level generally (Marcon *et al.*, 2022; Story *et al.*, 2017); however, competence needs specifically for service introduction have not been previously accentuated. Service managers highlighted that smart services necessitate skills, capabilities and resources in service delivery and customer service, thus stressing that introducing smart services is not only a technical issue but also has a strong organisational dimension. Smart services also affect customers' processes beyond the delivered solutions, and this requires new skills and capabilities from the focal firm. For example, by offering expertise to customers in developing their entire production system in addition to supplying products and smart services, as explained by one interviewee: "Customers more and more expect that we can [. . .] comprehensively support rationalising and developing their whole production processes (SM4)". The interviewees also shared some concerns about whether they have the proper competences to offer smart services, such as when the smart services shift the emphasis of the work towards customer service.

The salespeople highlighted the need for certain types of expertise and understanding to sell services (also Kindström *et al.*, 2015), including knowledge of service content and understanding of pricing. A clear service sales process and sales material were among the main requirements of salespeople. While the salespeople acknowledged the importance of learning by doing, they also demanded more training on the practical service sales process and tools that they can use to get their work done. In this case study, external salespeople and customers have not mentioned any internal requirements regarding competences; these findings may indicate that regarding the manufacturer's services, external actors rely more on the support from the manufacturing firm.

4.2.4 Data security and management

Data security and management relates how well the data are secured, and that data management and ownership can be handled. Many interviewed service and development personnel stressed the importance of data security, management and ownership issues as preconditions for introducing smart services to market (also Ives *et al.*, 2016). Data-related concerns require proper handling, and in essence, potential issues need to be clarified with customers. As one interviewee explained, many customer firms have strict data security policies and practices: "And the [service delivery] is often dependent on data security, let us say, the larger the firm [. . .] the more massive is their IT organisation and then there may be even, very strict guidelines (SM1)".

While much of the literature discusses the loss of control on data and data ownership as potential barriers of adopting smart services by the customers (Wünderlich *et al.*, 2015; Porter and Heppelmann, 2014), a few customers in this study explicitly raised concerns about data security of smart services. Nevertheless, it was not highlighted as an insurmountable obstacle but more as a solvable challenge, as one interviewee specified:

> Now it [data security] is an obstacle, but not like a barrier that we could not solve. I mean if there is some concept [. . .] and we see clear added-value to our business, then we can one way or another resolve that (C8).

Since the issue of data security and management was not apparent in the experiences of salespeople, the findings may indicate the lack of awareness of the smart service specific data security concerns among the salesforce.

4.3 The interconnectedness of actors' requirements in introducing smart services

Building on the findings presented in Sections 4.1 and 4.2, our study identifies four types of interconnectedness of actors' requirements. We concur with Ciasullo *et al.* (2021) that smart service business includes complex interaction patterns between multiple actors, and there is a need to understand the connectedness between the requirements of actor groups. This study offers new evidence from a triadic perspective by covering the different inputs of each actor and their interconnectedness (Andersson *et al.*, 2019; Wynstra *et al.*, 2015). The interconnectedness of actors' requirements was mapped in terms of either resource interdependence or a function of actors' intentions and interpretations in relation to each other (Vedel, 2016) (Figures 1–4). Our findings on the interconnectedness between actor's requirements extend the dominant view on enablers and barriers of smart services as rather static parameters in dyadic relationships (Kamp *et al.*, 2022; Klein *et al.*, 2018).

All actors were involved in defining and interpreting service value (Figure 1) in introducing smart services. The salespeople needed more information from the service side on the content and value of the services to define value propositions properly and communicate to customers. Both internal and external salespeople also looked for more knowledge about the system and the service mix of the case company. This knowledge helped them to better understand the links with new smart services, and thus facilitate the communication of service value. Customers also benefited from more knowledge about the links between smart services and existing systems and product optimisation to better grasp the service concept and value. Some internal and external salespeople explained that they were more willing to offer services, including smart services, when the customer proactively asked for the service and knew the value of the services. This is particularly related to possible increases in the contract's cost. Of course, this issue is not only related to smart services but also to all types of life-cycle services.

Regarding reliability of smart services, the findings revealed that the attitudes of internal and external salespeople towards smart services were affected by their perceptions of the

reliability of basic services and the competence of service delivery people. The failure in providing basic service negatively affected some salespeople in terms of the perceived service reliability. Thus, they preferred not introducing smart services to the customers. While smart services represent novel offerings, the customers often considered the reliability of basic services and the existing service competence as a basis for evaluating the perceived reliability of the smart services. Worries about the focal company's service competence concerned primarily existing help-desk services that used on-demand data access to solve different machine errors, faults and problems. However, as many smart services would rest on the same service infrastructure, it played a certain role regarding how customers responded to other smart services. For example, one customer described help-desk services: "When there is an ongoing problem [. . .] they can usually handle it quite fast remotely [through the helpdesk] (C5)". Conversely, customers also reported negative experiences. One customer stated: "My experience was that they [help-desk personnel] [. . .] have to every time check with the other department to solve my problems [. . .] they would say 'yeah I am a guy from the robots [department] and solving the problem will be difficult for me' (C6)".

Competence requirements for smart services were strongly relying on the actors' perception of the service team's expertise and resource availability. Salespeople shared some concerns; although the company offers smart services, such as data-based consulting services, these services are not actively offered by the salespeople because these services are heavily dependent on the availability of specific service experts. Moreover, to offer smart services, both internal and external salespeople relied on service people to support them in terms of providing knowledge and information, training and engaging in the sales process. A sales manager explained:

> I think it is better to have somebody from the service unit, who can then have that discussion [detailed technical discussion] with the customer, so that salespeople do not have to worry about that, and they can really focus on how to close the deal (IS3).

The issue of data security and management was resolved in a dyadic relationship between the service managers and customers, where service managers had to carefully consider data security requirements and customers concerned about data leaks or ownership of data when dealing with smart services. On the one hand, this primarily concerned the internal capabilities of the manufacturing firm in securing data. On the other hand, it relied on how service managers could communicate service value and collaborate with the customer to increase the customer's understanding of the novel smart services and made them certain about the competencies of the manufacturing firm and that security and ownership of data are managed well. Most customers emphasised that if smart services were expected to provide sufficient value, issues concerning data security and management were not raised as major hindrances as long as the service supplier paid attention to the issue.

5. Discussion and implications

5.1 Theoretical contributions

This study investigated the requirements of multiple actors – service managers and internal salespeople in a manufacturing firm and its external salespeople and customers – to introduce smart services. The paper focused on downstream actors and the complexity of their requirements in terms of the variety of needs and their interconnectedness in the introduction of smart services. In doing so, eight categories of requirements were identified, with each category raising important implications and challenges for the further development of manufacturing firms' smart service business. As a result, the study makes three main contributions regarding the service introduction phase and requirements of different actors and the interconnectedness of requirements in introducing smart services.

Firstly, our study extends the service innovation literature (Kampker, 2018; Lusch and Nambisan, 2015) by emphasising the service introduction phase as an important multi-actor episode in the manufacturing firm's transition towards smart services and by providing a rich and in-depth information of the requirements of the internal functions (i.e. service managers and salespeople) and selected network actors (i.e. external salespeople and customers). Recent studies on smart services, mainly from a focal firm perspective or in a dyadic relationship with customers, have acknowledged the uncertainty on the demand side of smart services (Kamp *et al.*, 2022; Klein *et al.*, 2018; Momeni and Martinsuo, 2018). While successful implementation of smart services requires new capabilities (Ardolino *et al.*, 2018; Hasselblatt *et al.*, 2018), processes and business models (Kohtamäki *et al.*, 2019), it also requires the understanding of the uncertainties, concerns and needs of different actors (Töytäri *et al.*, 2018). The identified requirement categories provide a more explicit understanding of the latter stage of service innovation and steer the firm towards service introduction.

Secondly, the findings go beyond identifying the requirements of each actor individually, by demonstrating that the requirements of each actor group in introducing smart services are interconnected with other actor groups. The fluency of introducing new smart services, therefore, is a collaborative endeavour requiring actors' continued, mutual support for each other. In this regard, the manufacturing firms need to incorporate the cognitive needs of different actors into their service innovation processes and specify where to focus on, to ensure that they succeed in launching their new smart services. The literature on service readiness emphasises the criticality of early stages of bringing the service into the market and the need for increasing readiness in customers and intermediaries (Vaittinen *et al.*, 2018). In a multi-actor setting, we demonstrate that service introduction cannot be viewed as manufacturer's development task or customers' adoption decision only. Rather, success in introducing smart services necessitates understanding the interconnection between actors' requirements as either a result of resource interdependence or a function of actors' intentions and interpretations in relation to each other:

P1. Introducing smart services necessitates fulfilling a combination of multiple actors' interconnected requirements.

Specific requirements for introducing smart services, and particularly value and reliability of smart services, emerged as rather complex requirements. Smart services have been

recognised as a way to enhance customer value (Brax and Jonsson, 2009; Kiel *et al.*, 2017; Momeni and Martinsuo, 2018). Literature on smart services emphasises the perceived value of smart services (for customers) as an important enabler for the adoption of these novel services (Jayashankar *et al.*, 2018; Klein *et al.*, 2018). Literature on service readiness also identified the perceived benefits and reliability of services as key parameters to increase readiness within the organisation as well as among customers and intermediaries while considering those actors as rather separate entities (Vaittinen *et al.*, 2018; Vaittinen and Martinsuo, 2018). In multi-actor setting, we illustrate that the understanding of the value of a service is not formed only based on one actor's perception, but it evolves and changes based on the relationships and the discussions between the actors. The analysis of the findings also revealed that the issue of reliability covers smart services in particular and service delivery in general. The latter includes smart services *vis-à-vis* experiences from the delivery of basic services, and thus, service reputation of the manufacturing firms. Although reliability and value are usually considered as something that pertains to customers, our study shows that in addition to customers, manufacturers need to convince other actors, such as salespeople too. Therefore, confidence in the reliability of smart services is not limited to how each actor understands the quality of the installed system and the delivered services, responsiveness and competences of the service design and front-end service personnel (Oliva and Bean, 2008); the understanding can be built through interactions with other actors:

P2. Value and reliability of smart services are particularly interconnected requirements and involve a diversity of actors whose perceptions evolve and change based on the relationships and the discussions with other actors.

Thirdly, our study on the interconnectedness of actors' requirements unravels the linkage between smart services and the existing services (Sousa and da Silveira, 2017; Klein *et al.*, 2018) by demonstrating how general service requirements act as contextual conditions for enabling specific requirements of introducing smart services, allowing propositions 3 and 4 to be proposed. Our findings go beyond the importance of defining suitable value propositions (Gebauer and Friedli, 2005; Klein *et al.*, 2018; Töytäri *et al.*, 2018; Vaittinen and Martinsuo, 2019) and demonstrate how the general attitude towards services and knowledge of installed base of equipment and services, specifically in the salespeople and customers groups, can be critical for understanding the value of smart services. Moreover, the findings explicate the importance of previous service experience (Kaski *et al.*, 2017; Vaittinen and Martinsuo, 2018) by demonstrating its impacts on the perceptions of the reliability of smart services and competences required for them, not only for the customers but also for the internal and external salespeople:

P3. General attitudes towards services and the level of knowledge of the installed base of equipment and services affect the perception of the value of smart services.

P4. The level of reliance on service employees and their service reputation affects the perception of reliability of smart services and the required competence for offering them.

5.2 Practical implications

Smart services are gradually gathering momentum among manufacturing firms. Our findings generally suggest that instead of focusing on fulfilling customer requirements only, manufacturing firms should address the requirements of the broader network consisting of sales and service personnel, customers and external salespeople comprehensively. Several practical implications can be drawn for the manufacturers that intend to introduce smart services into the market. Firstly, to successfully introduce smart services, manufacturing firms need to understand the nature of the requirements. Firms need to understand that smart services cannot be treated in the same way as traditional services. That is, they need to acknowledge the existence of a concurrent set of actors' requirements and the interconnectedness between them. This calls for a closer integration of actors into the new smart service launch to enable the actors' expression of concerns and related responses early enough. For instance, to increase the reliability of smart services in customer's eyes, executives should monitor and pursue to improve how internal and external salespeople understand the quality of the installed base of equipment and the delivered services, responsiveness and service competences of service people. The findings thus represent a valuable framework for executives seeking more contemporary solutions.

Secondly, an important managerial implication emerges from the impacts of general service requirements for introducing smart services. Although smart services differ from traditional services in many respects, they cannot be treated in isolation in service introduction. In particular, to be able to highlight the value of smart services, the executives should contribute to the general attitude towards services and increase the knowledge of installed base of equipment and services both within their own organisation and beyond the firm boundaries.

Thirdly, even though the study focused on service introduction, the findings indicate that the requirements of actors could be more integrated into the whole service innovation process from the early stages to market introduction and beyond. Explicating concerns and viewpoints of other actors throughout the development process could build trust in smart services, for example, regarding reliability and value that were recognised as particularly interconnected requirements. For example, our findings highlight how salespeople, in general, rely on service people and external salespeople rely on the manufacturing firm's resources or how the perceived manufacturer support affects the perception of reliability of smart services.

Fourthly, manufacturing firms could use the findings as a template to investigate if they have taken all relevant aspects into consideration when planning a market launch for their new smart services. Our initial list of requirements could be complemented with requirements stemming from the specific industry contexts of the companies, which can lead to more specific strategies and measures.

In sum, our findings encourage manufacturing firms that develop smart services to involve network actors (e.g. sales and service personnel, customers and external salespeople) more closely in the service introduction phase. Although the general involvement of the network actors in developing the new smart services falls outside the scope of this study, our findings strongly imply that the introduction of smart services requires the integration of several actors' viewpoints in the critical juncture that precedes market success – market launch. Our findings do not pinpoint any specific measures of how to map and integrate these views in practice. Various information gathering and value co-creation techniques may provide a starting point for managers that wish to incorporate the viewpoints of sales and service personnel, customers and external sales people.

5.3 Limitations and future research ideas

Conducting the case study in one context limits the generalisability of the findings. The interconnectedness found between different actor groups may give support for further research towards testing these propositions. This case study included data from the manufacturing firm, external salespeople and customers, but it could have benefited from the data, for example, from external service providers or software suppliers to further strengthen the network perspective. Additional multi-actor studies are necessary to enhance the understanding of the service introduction stage as a key episode in manufacturing firms' transition towards smart services. Moreover, it is recommended that future studies concentrate on the ways in which the requirements of different actors could be met and to discover possible interrelationships or dynamics between service development practices. Also, the different methods of integrating network actors' views into the service introduction phase (e.g. co-creation methods) warrants further inquiry based on our finding. It would also be worthwhile to consider how dominant the role of certain actors is in service introduction (e.g. service managers vs salespeople) and if some actors are more dominant in different contexts. Finally, this study highlighted the notion that the experience with existing services is an important factor in introducing smart services. This connection between satisfaction with non-digital services and readiness to introduce smart services merits further longitudinal examination.

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