Servitization innovation: A systematic review, integrative framework, and future research directions

Abstract

Servitization has emerged as an important research topic in the fields of innovation and technology management that connects products and services with the purpose of enhancing competitive advantages of focal firms. The manifestation of servitization varies across industry sectors, as it began from the manufacturing industry with rapid expansion into the digital economy enabled by the advancement of digital technology. Servitization innovation denotes the innovative approaches by which servitization is organized from the organizational governance perspective. Despite the steady increase in scholarly attention and accumulated body of knowledge on servitization, it remains unclear what are the archetypes of servitization innovation and what are the differences between the actors, mechanisms and instruments for servitization innovation. This paper aims to synthesize the received wisdom and contemporary understandings on servitization innovation by undertaking a systematic literature review of the field. From the technology-oriented perspective, we articulate the characteristics of servitization innovation within a pure manufacturing context and a digital context by proposing a typology of servitization innovation, namely organic, relational, and system. We conclude this review by presenting future research directions to further develop servitization innovation, especially within the context of technological innovation.

Key words: servitization innovation, organizational governance, servitization, digital, digitalization, manufacturing

1. Introduction

Servitization has emerged as a rapidly growing and important research stream, manifested by the vibrant research activities and prolific publications across a wide range of disciplines, such as operation management (Baines et al., 2017; Neely, 2008), innovation management (Bustinza, Opazo-Basaez, & Tarba, 2021), technology management (Paiola, Schiavone, Khvatova, & Grandinetti, 2021), and marketing (Vendrell-Herrero, Bustinza, & Vaillant, 2021), among others. Enabled by the advancement of technologies and innovation in organisations business models, several new organizational forms have been explored under the concept of servitization, such as territorial servitization, digital servitization, platform-enabled servitization, or servitization ecosystem. Despite increasing attention being paid to the importance of servitization in diverse organizational settings and technological contexts, the understanding of servitization from an organizational perspective remains fragmented, with no coherent theoretical underpinning. Consequently, this deficit can constrain the theoretical development of servitization and its implication on technological innovation. This paper aims to fill this important gap by examining the innovative approaches by which servitization is organized from the organizational governance perspective, which we define as servitization innovation.

Servitization has initially been conceptualized as the endeavours used by manufacturing companies to enhance their competitive advantages by extending product offerings to include services (Baines et al., 2017). Broadly speaking, servitization can be categorized as basic services, intermediate services, and advanced services (Baines & Lightfoot, 2013). This perspective of servitization essentially captures how manufacturing companies themselves mobilize and deploy resources, cultivate capabilities and competencies, design strategies and operations to expand product offerings to service offerings. By contrast, another approach to achieve servitization has been labelled as alternative servitization (Vendrell‐Herrero & Wilson, 2017). This perspective emphasizes the collaborative characteristics between the focal firms and the external partners. For example, the interaction and collaborative partnerships between manufacturing companies with KIBS (knowledge intensive business services) firms. Building upon this alternative servitization, an adjacent concept of territorial servitization refers to the advantages and generative benefits gained for regional revitalization and economic development by implementing the co-location and interactions between manufacturing companies and KIBS. Intuitively, the conventional servitization approach or alternative one largely resonates with the classic “make or buy/ally” decision that follows the logic rooted in the transaction cost theory (Bustinza, Lafuente, Rabetino, Vaillant, & Vendrell-Herrero, 2019).

However, the dynamic development of digital servitization highlighted the empowerment of digital technologies and its impact on servitization strategies, trajectories and outcomes (Coreynen, Matthyssens, & Van Bockhaven, 2017), which challenges the prevailing conjecture of “make or buy/ally” by bringing additional complexity to understand servitization innovation in digital contexts. Digital servitization may result from manufacturing companies’ own endeavours to utilize digital technologies in offering services to customers. By contrast, manufacturing companies can also partner with digital technology providers to create, deliver, and capture value through service offerings (Sklyar, Kowalkowski, Tronvoll, & Sörhammar, 2019). Furthermore, due to the wide variety in the utilization of digital technologies, partners may involve more than one organization with the possibility of extending to a broader system-level, such as platform or ecosystem, within which the manufacturing companies play crucial roles in orchestrating organizational arrangements with the goal to generate value through innovation.

Despite the accumulated knowledge and the aforementioned variety of servitization, the extant literature lacks theoretical understanding on the innovation approaches by which servitization can be organized and governed. This paper fills this important gap. Organizational governance adaptation (Klein, Mahoney, McGahan, & Pitelis, 2019) can serve as one useful theoretical lens to examine

organizational actors, activities, mechanisms, and organizational boundaries that embody the innovative approaches and interactions demarcated by diverse organizational arrangements.

To be specific, our research questions are:

- What are the architypes for servitization innovation?
- What are the differences between the actors and mechanisms for servitization innovation within a pure manufacturing context and a digital context?
- What are future research directions to further develop servitization innovation within the context of technological innovation?

To answer our research questions, we conducted a systematic literature review (Tranfield, Denyer, & Smart, 2003). We followed the latest developments in the systematic literature review methodology from previous published work (Wang & Chugh, 2014; Leonidou, Christofi, Vrontis, & Thrassou, 2020; Fan *et al.*, 2022) to ensure our methodology is both rigorous and practical in selecting the sample papers and performing data analysis of the literature. To the best of our knowledge, this is the first literature review to approach servitization from the perspective of organisational governance with the aim of understanding innovation within servitization. For instance, Luoto *et al.,* (2017) take a narrative approach to their meta-analysis to understand the paradigmatic and rhetorical assumptions of the servitization field. Green *et al.,* (2017) seek to demarcate the differences between two different paths for servitization research, those led by a goods-dominant logic and those led by a service-dominant logic. Baines *et al.*, (2017) sought to consolidate the literature base and focus future research around a framework underpinned by organisational change theory. Finally, Rabetino *et al.,* (2018) seek to understand the intellectual structure of the field to understand disciplinary boundaries and connect past research together to provide to support more mature advances in the field moving forward. Therefore, whilst other literature reviews within servitization exist, we complement them by taking what can be described as the prospectors path (Breslin & Gatrell, 2020) to theorising from literature reviews as we seek to set out new conceptualisations for innovation within servitization by analysing the literature using organisational governance theory.

Our paper makes three contributions to innovation literature. First, we contribute by conceptualizing the notion of servitization innovation by adopting the organization governance theory to systematically review the servitization literature. We argue organizational governance can play a crucial role to significantly advance our understanding of the servitization literature in both theory and practice. In particular, we ground the architypes of servitization innovation, namely organic, relational, and system. Second, our research articulates the interaction between actors and mechanisms for servitization innovation by highlighting the different organizational forms and arrangements between manufacturing companies and services. This helps to synthesize the body of knowledge and clarify commonalties and distinctive characteristics among different terminologies in relation to servitization. Third, amid the rapid advancement and deployment of digital technologies, our comparative perspective between pure manufacturing context and digital context contributes to a nuanced understanding of how technology context may shape and influence the servitization strategies of manufacturing companies and their impact on servitization innovation. In doing so, our study contributes to the servitization innovation by exploring the influence of contextual factors and clarifying the boundary conditions.

This paper is organized as follows. We first present the systematic literature review as our research methodology. Within this section, we articulate the conceptual boundaries of the review. Afterwards, we discuss our results and synthesis from the data analysis of the literature. We conclude this paper by discussing the theoretical and practical implications and suggesting future research directions.

2. Methodology

Systematic Literature Reviews (SLR) are common within the field of innovation management (Leonidou, Christofi, Vrontis, & Thrassou, 2020; Li, 2020; Obradović, Vlačić, & Dabić, 2021; Slater, Mohr, & Sengupta, 2014). SLRs are primarily used by studies seeking to consolidate literature within their chosen area in order to provide a theoretical contribution and/or future research directions for the field in an analytically robust way. However, the manner of the contribution can vary. As described by Breslin & Gatrell (2020), scholars can contribute in multiple ways along the miner-prospector continuum, which they define to illustrate different approaches to theorising with systematic literature reviews. On the one end, miners contribute alongside other scholars to a well-defined discipline, whilst at the other, prospectors' step outside of disciplinary silos to contribute more novel theoretical and conceptual insights to the literature. In the case of the literature review conducted within this study, our aim is to conceptualise innovation within servitization by theorising with organisational governance literature. To do this, the review draws on a broad range of disciplines (see table 1). Given this aim and approach, this review adopts the prospectors path and steps outside of disciplinary silos to provide a novel contribution to the innovation management and servitization literature.

In addition to the purpose of our research, the choice of SLR over other review methods was decided for several reasons. First, narrative reviews and integrative reviews adopt more informal processes of reviewing and are largely based on representative literature within the field (Fan *et al.*, 2022). This has two weaknesses as it introduces research bias in sample selection and analysis, and it makes it difficult to understand how the new insights generated from the review are created (Snyder, 2019). SLRs overcome these weaknesses as they provide a robust set of procedures that support replicability and transparency in research (Tranfield et al., 2003) that helps ensures a) the research achieves validity in the review process, b) a method of reducing researcher bias in the article selection process and finally, c) greater quality in the final output of the review (Christofi, Leonidou, & Vrontis, 2017; Christofi, Vrontis, Thrassou, & Shams, 2019; Wang & Chugh, 2014). Furthermore, as this research is focussed on a specific, well-defined domain and has clearly specified research questions, it lends itself to a SLR (Fan *et al.*, 2022). Finally, similar to Leonidou et al., (2020), a SLR was deemed more appropriate for this research as opposed to a meta-analysis as meta-analysis tend to focus on quantitively analysing effect size based on a given set of variables and the relationships between them, limiting the research to specific types of empirical questions (Tranfield *et al.*, 2003). This contrasts with the aim of our research and our research questions, which require the integration of qualitative and quantitative research to generate insights into the archetypes of servitization innovation and the actors and mechanisms for servitization innovation. Based on these reasons, a SLR was deemed to be most suited and beneficial to address the research questions presented in section 1.

The SLR process used in this research is presented in Figure 1 and is adapted from Wang & Chugh (2014), where we follow the same process as the original authors but modify the content of each step to align to the objectives of this research.

=== insert Figure 1 about here ===

Whilst this research process was designed to develop theory in the context of servitization innovation, by detailing a transparent process and drawing on the six quality criteria for systemic reviews in the context of evidence-based management (Briner *et al.*, 2009), this research also holds insights for practitioners. We satisfy the six criteria presented by Briner *et al.*, (2019) by: providing a clear set of research questions (section 1), including a broad range of stakeholders in the research, which we do via the inclusion of three scholars from different disciplinary homes, conducting extensive searches across multiple databases (section 2.2), presenting a coherent summary of the findings in a transparent and accessible format (section 3), the study identifies what is known and what is not known within the

existing body of literature and provides a clear set of future research directions (section 4 and 6). By addressing these six quality criteria, this paper not only advances knowledge in servitization innovation through the lens of organisational governance, but it also assimilates a reliable knowledge base from which insights for practice can be drawn (Briner & Denyer, 2012).

2.1 Conceptual boundaries of the review

For the purpose of conducing high quality SLRs (Christofi, Vrontis, & Cadogan, 2021c), it is crucial to articulate the conceptual boundaries of the review. This is especially important in a fast-growing field that connects multiple disciplines, such as servitization, where scholarly work tends to be fragmented. Furthermore, concepts and terminologies might be used interchangeably stemming from the diverse theoretical roots and the preferred pragmatic reasons of the scholars from different disciplines. Although cross-fertilization has been encouraged to bridge discipline boundaries in research endeavours, concept clarity has always been a challenging undertaking for scholars to fathom the assumptions and boundary conditions of a focal concept. This has naturally occurred in the field of servitization research. Our observation has been corroborated by this SLR endeavour. Therefore, our aim is to define and understand the unique characteristics of servitization innovation. Our conceptual orientation is servitization and the processes and endeavours used by manufacturing firms to develop or deploy services to gain competitive advantages.

This section defines the SLRs conceptual boundaries in line with the RQs, following a standard process within SLRs (Vrontis & Christofi, 2021). Innovation approaches and trajectories within servitization have been studied from a variety of perspective, including marketing, operations and technology management and innovation management. As a result of these broad disciplinary perspectives, the topic of servitization, and with-it studies focussed on innovation within servitization, has been studied under a broad range of headings (Smith, Maull, & Ng, 2014). That said, the most common terminology across all disciplines includes hybrid offerings, servitization, service infusion, advanced services or service business model innovation. For example, servitization has been used within marketing (Vendrell-Herrero, Bustinza, Parry, & Georgantzis, 2017), operations and technology management (Baines et al., 2009) and innovation management (Visnjic, Neely, & Jovanovic, 2018) consistently, even where the article title indicates another term such as service business model innovation (Visnjic, Wiengarten, & Neely, 2016). Even where different terms have been used, for example when hybrid offerings is used (Ulaga & Reinartz, 2011), there is general agreement that servitization reflects a competitive strategy through which organisations shift from selling product to selling advanced services (Smith et al., 2014). Within the strategic shift, the way in which customers obtain value from the organisation changes, with a focus on the outcome delivered in use by the product-service system, or more recently product-software-service (Kohtamäki, Rabetino, Einola, Parida, & Patel, 2021), delivered by the organisation as opposed to the exchange of the product from one party to another. Given the aim of our study to analyse servitization innovation, articles that consider servitization as a broad topic using a range of different terms are to be included and considered within the conceptual boundaries of this research.

2.2 Data Collection and Analysis

In order to create a relevant sample of journal articles for our SLR, relevant databases, keywords and timeframes relevant to the research needed to first be identified, defined and agreed. The keywords were defined in line with other SLRs or meta-analysis within servitization (e.g., Rabetino *et al.,* 2018; Luoto *et al.,* 2017; Garcia-Martin *et al.,* 2019) and the aim and research questions for this research. In similar vein to other SLRs within the innovation management discipline (Obradović et al., 2021) and the study of servitization (Zhang & Banerji, 2017), the following databases were used to search for

relevant articles: Scopus, Proquest, Science Direct. These databases were searched in the order presented here. Within these databases, the abstract, title and author specified keywords were used to restrict our search against our keywords as commonly done is SLRs (Christofi, Pereira, Vrontis, Tarba, & Thrassou, 2021b). Following the guidance of Rabetino *et al.,* (2018) and Castañer & Oliveira (2020), the selected articles must contain at least the primary keyword (e.g., servitization) in either the title, abstract or author provided keywords. Each selected article must then include one of the four supplementary keywords (e.g., platform). The applied search string is IN [title OR keywords OR abstract] [primary search phrase] AND ["supplementary search phrase 1"] IN [full text] LIMIT TO [PUB YEARS 2010-2021] LIMIT-TO [DOCTYPE "article"] LIMIT-TO [LANGUAGE, "English"] LIMIT-TO [SRCTYPE, "Journal"]. The primary search term was servitization and the supplementary terms were platform, ecosystem, product and service innovation and digital. In similar vein to Castañer *et al.,* (2020) we executed four separate searches in each of the databases, one for each supplementary search term. After the search, full Inclusion and exclusion criteria were then applied as shown in Table 1.

=== insert Table 1 about here ===

To ensure the research satisfied validity and reliability criteria for SLRs, this research followed procedures set out by Castañer & Oliveira (2020) and Transfield *et al.,* (2003). Specifically, the procedures sought to ensure the research sufficiently addressed retrieval, expectancy, and selection bias during the research process. First, given servitization research in general saw an upward trajectory in research outputs from 2007-2010 (Lightfoot *et al.,* 2013), the timeframe of 2010-2021 was deemed sufficient for more emergent literature streams (e.g., ecosystem and digital research) to be captured, reducing retrieval bias. Second, clear inclusion and exclusion criteria were generated from existing literature, with justifications for each choice provided (see table 1), reducing both retrieval and selection bias. Third, a data extraction sheet was developed to help reduce selection and expectancy bias. According to Tranfield *et al.,* (2003), data extraction sheets provide a "*historical record for the decisions made during the process and provides the basis on which to conduct data synthesis*" (pp. 213). Data extraction sheets typically contain general article information (e.g., authors and publication outlet), study specifics (e.g., methods used and theoretical orientation) and notes on themes that emerge from the analysis. Within our research, the following thematic codes were used to code the articles: 1) name of the authors; 2) article title; 3) aims of the research; 4) research topic/question(s); 5) key terms and definitions; 6) conceptual underpinning; 7) research strategy; 8) type of research (e.g., exploratory); 9) research context; 10) services studied; 11) results/conclusions/implications; 12) digital technology or manufacturing; 13) primary theme (e.g., organic/relational/system). A sample of the data extraction sheet is provided in the appendix. The data extraction sheet ensured consistency in analysis of the research against defined thematic codes aligned to the research (see below) and acted as a "*data-repository from which the analysis will emerge*" (pp. 217). Finally, against these codes, the authors engaged in manual coding as the articles required significant care and focus when reading in order to capture the required information for the analysis. To complete the coding process, two members of the research team independently read the articles within our analysis. To support research quality, a sample of the analysis was checked by the third researcher. Where the primary coders found differences, the authors discussed their analysis and either came to an agreed conclusion or involved the third author to reconcile their differences. This process is in line with Wang & Chugh (2014) and ensures a high level of inter-coder reliability, reducing expectancy bias.

Following definition of our keywords, the databases to search within and the timeframe that bounds our search period, a comprehensive sample of research articles to be analysed was created (i.e., the

execution stage (Tranfield et al., 2003)). Using the search terms and time period defined, our search process was executed within each database across author supplied key words, article title and the article abstract. The initial search resulted in the following returns for each database:

- Scopus: 259 papers returned, 80 downloaded.
- Proquest: 38 papers returned, non-downloaded due to duplication with Scopus.
- Science Direct: 132 papers returned, 51 downloaded, 26 duplicates with Scopus were not downloaded for the Science Direct database.

This resulted in a total of 131 papers downloaded. After the full application of the inclusion and exclusion criteria by two of the researchers from Table 1, we were left with 55 articles for analysis. The papers included in this systematic literature review are listed in the Appendix, where a sample of the data extraction sheet is provided.

To enhance the validity of our study, we triangulated our results from our primary search described above using Google Scholar (Wang & Chugh, 2014). This approach would mitigate the risk of article exclusion and overcome a limitation commonly associated with SLRs e.g., restricted search criteria and databases. On Google Scholar, the following keywords were searched 1) Servitization AND Platform 2) Servitization AND Ecosystem 3) Servitization AND Innovation 4) Servitization AND Digital between the same time period specified in our primary search. These searches resulted in 9,140 results for search string one, 7,440 for search string two, 13,800 for search string three and 9,200 for search string four. In line with Wang & Chugh (2014), we focussed on a comparison between the top 100 items from each Google Scholar search with our sample. The number of articles found in the Google Scholar search and our sample was 23 for search string one (46% match), 30 for search string two (60% match), 19 for search string three (38% match) and 27 for search string four (54% match). Within each string there were duplicates and Google Scholar captured a broader set of literature across each string due to the limited search functionality compared to our databases. Given these results, the authors concluded that the primary database search had identified and included the relevant articles.

3. Results and synthesis

3.1 Architypes of servitization innovation

By viewing the servitization innovation phenomenon from the organizational governance perspective, our analysis reveals three architypes of servitization innovation, namely organic, relational, and system. In the following, we will report the data analysis of the literature according to these three architypes.

3.1.1 Organic

Organic refers to the innovative approach by which servitization innovation stems from manufacturing companies themselves. The essence is that it can help manufacturing companies to enhance competitive advantages through servitization and product-service systems (Baines & Lightfoot, 2013). Furthermore, the competition among manufacturers locally and globally pushes the new way of creating and delivering value for customers. Intuitively, organic represents the “make” decision taken by manufacturers themselves in their pursuit of servitization endeavours. Although services can be a natural extension of the product offerings by manufacturing companies, the service strategies pursued by manufacturers can categorize firms as ‘doubters’, who view services as a weak differentiating factor; ‘pragmatists’, who view services as an approach to creating greater product

differentiation; and ‘enthusiasts’, who view services as a key growth strategy (Raddats & Kowalkowski, 2014).

Therefore, following the organic approach manufacturing companies may encounter different challenges when they develop new service(s). For instance, based on the qualitative analysis of UK-based manufacturers with services strategies differing with respect to the importance of services within their portfolios of offerings (Burton, Story, Raddats, & Zolkiewski, 2017), it reveals that if manufacturers try to 'break free' from their product heritage, they risk losing key product advantages. Consequently, this can limit the role that services ultimately play in a manufacturing business. Another study, based on a quantitative study of 226 large manufacturing firms, suggests that customer participation can enhance the effectiveness of new service development strategies by manufacturing firms (Morgan, Anokhin, & Wincent, 2019).

A notable observation is the importance of resource readiness and internal organizational capabilities that may enable or hinder manufacturing companies to develop, extend and add service offerings to their existing products. For instance, one study uses fuzzy-set qualitative comparative analysis to examine 131 Swedish manufacturing firms and identifies four capability configurations that enable advanced service offerings (i.e. operational services and R&D services as prominent examples of advanced service offerings in this study) in manufacturing companies (Sjödin, Parida, & Kohtamäki, 2016). In a similar vein, by distinguishing manufacturing capabilities and service ones, one study found that manufacturing capabilities associate with the provision of basic services, while service capabilities associate with both basic services and advanced services (Sousa & da Silveira, 2017). By using a large-scale survey, this study suggests basic services do not impact financial performance, but support the offering of advanced services. Therefore, it is important for manufacturing companies to be equipped with adequate levels of manufacturing and service capabilities and to enact a balanced adoption of basic services and advanced services, when they embark on the servitization trajectory following the organic organizational governance approach.

3.1.2 Relational

Relational refers to the innovative approach by which servitization innovation emerges from the collaboration between manufacturing companies and collaborative partners. From a relational organizational governance perspective, the key criterion is the interaction between manufacturing companies and external organizations. An important distinction between the organic and relational is who gets involved in the servitization innovation. For example, service suppliers can provide important knowledge, especially the dynamics of knowledge sharing, for servitization of manufacturing companies (Ayala, Paslauski, Ghezzi, & Frank, 2017). Alike the choices for obtaining new technology (White, 2000): organic is meant to internalize production (make), while relational refer to either obtain the technology from another organization (buy), or undertake joint development with another organization (ally). Conceptually, organic should be making decisions on transaction performed within a firm boundary, whereas relational should be either buy or ally decisions. Similar to the organic perspective, capabilities of participating organizations also play an important role in driving servitization from the relational perspective. For instance, by examining UK-based manufacturers, intermediaries and customers across multiple sectors, it found that complementary and competing capabilities within a manufacturer's downstream network is required to facilitate the implementation of advanced services (Story, Raddats, Burton, Zolkiewski, & Baines, 2017). In addition, directly addressing digital servitization from the perspective of relational theory, it found four relational components – complementary digital capability, digitally enabled knowledge sharing routines, relation specific digital assets and knowledge sharing routines – that support the successful development of profitable advanced services (Kamalaldin, Linde, Sjödin, & Parida, 2020).

Another important concept in understanding servitization from the relational organizational governance perspective is alternative servitization. For instance, KIBS (knowledge intensive business services) firms collaborate with manufacturing companies by serving as service providers in the servitization process. One study based on Spanish manufacturing firms using fuzzy-set qualitative comparative analysis suggests collaboration with KIBS firms enables manufacturing companies to benefit from Smart Manufacturing technologies (Bustinza et al., 2021). The notion of territorial servitization emphasizes the impact of the collaborative partnership between manufacturing companies and KIBS on regional economic dynamism and development (Lafuente, Vaillant, & Vendrell-Herrero, 2017). Using 17 Spanish and 38 German regions during the period 2010–14, one study investigates how a local manufacturing sector simultaneously stimulates and is stimulated by developing a complementary knowledge intensive service sector (Gomes, Bustinza, Tarba, Khan, & Ahammad, 2019).

Because relational essentially means how to choose and deal with partners by manufacturing companies through product-service offerings to create value for customers, several studies have explored the determinants of choosing the appropriate partners for relational servitization. For instance, one study identified and evaluated success factors in selecting partners with service networks to support the delivery of manufacturing based services (Weigel & Hadwich, 2018). Based on a quantitative analysis of data collected from survey, it highlighted that success factors played a significant role on the performance of the service networks, including improved innovation performance, customer satisfaction and long-term partner retention of service networks within servitization. Another study argues that partnering with external stakeholders may assist family manufacturing firms' innovation behaviour by embracing a relational perspective (Rondi, De Massis, & Kraus, 2021). In essence, relational represents the collaborative partnership approach underpinned by the "buy/ally" decision taken by manufacturers in designing and implementing servitization strategies. Furthermore, relational (buy/ally decisions) offer diversification growth opportunities in the form of horizontal, conglomerate, and concentric diversification (Varadarajan, 1986). For instance, some authors have analysed servitization in the context of developing concentric alliances (Bustinza et al., 2019).

3.1.3 System

System refers to the innovative approach by which servitization innovation occurs in a broader system context that involves manufacturing companies and multiple stakeholders. Increasingly, the servitization literature has evolved into the system approach by using the notion of platform or ecosystem. Although platform and ecosystem may carry both distinctive and common characteristics in the strategy or entrepreneurship literature, from the organizational governance perspective we may conceptually categorize them as the system approach in servitization innovation. Because the system approach goes beyond the collaboration between manufacturers and service providers while leveraging the efforts and contributions from other organizations in the endeavours of value (co-)creation, delivery and capture. Therefore, system can be more complex, dynamic and holistic, containing either "make" or "buy/ally" or "both" decisions depending upon the participants' willingness and ability, wherein manufacturing companies play a crucial role while interacting with multiple stakeholders to develop servitization. In other words, system would encompass make and buy/ally decisions, bringing more complexity to servitization innovation.

To bring clarity in synthesizing the literature, we will discuss the platform-based and ecosystem-oriented servitization innovation, respectively. Focussing on platforms, one study explored how manufacturing companies may successfully leverage platforms for servitization in an Industry 4.0 context by investigating four Chinese textile and apparel manufacturing companies (Tian, Coreynen, Matthyssens, & Shen, 2021). They found that upstream and downstream location in the value chain

can lead to servitization pathway dynamics. Another study explored how a platform approach facilitates the implementation of advanced service offerings in manufacturing firms (Cenamor, Sjödin, & Parida, 2017). Building upon the platform modularity argument, it reveals that the system approach in servitization based on a modular architecture can enable manufacturers to pursue both customization and operational efficiency. However, modularity or standardization may generate different impact on servitization. For example, one study found that manufacturers' decision to modularise or standardise affects the range of services they can offer, and while modularity presents challenges of engagement between ecosystem actors, standardisation is harder for manufacturers with intricate products and complex customer settings (Kapoor, Bigdeli, Schroeder, & Baines, 2021). This study demonstrates how and why the social and technical subsystems of a platform ecosystem change and interact in the advanced services context.

As for the ecosystem-orientation, one study investigated how equipment suppliers configure appropriate ecosystem strategies to realize digitally enabled process innovation for process industry firms (Kamalaldin, Sjödin, Hullova, & Parida, 2021). By viewing the complex product-service software systems as sources of process innovation, it suggests that equipment supplier need to simultaneously cooperate and compete with other ecosystem actor, while highlighting the complexity embedded in the system approach for servitization innovation. To further highlight the nature of complexity, one study explored how firms can successfully develop and commercialize autonomous solutions through the important and strategic alignment between technological, ecosystem, and business model perspectives by studying four industrial equipment manufacturers based in Sweden (Thomson, Kamalaldin, Sjödin, & Parida, 2021). Another study illustrates the process of ecosystem transformation toward a circular economy paradigm in offering advanced services by examining the six large manufacturing companies (Parida, Burström, Visnjic, & Wincent, 2019). It highlights ecosystem readiness assessment stage prior to ecosystem transformation.

To summarize the three architypes of servitization innovation, Table 2 contains key concepts and representative studies by following the organizational governance perspective. Figure 2 illustrates the distribution of the articles reviewed in this study according to three archetypes of servitization innovation. Notably, reviewing the system approach literature suggests that technologies play an important role in driving servitization innovation. Especially, digital technologies have emerged as an enabling factor that assists manufacturers to engage and enact with potential opportunities in the transition and transformation of servitization innovation. Thus, the technology contexts and their impact on servitization innovation will be discussed in the next section.

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3.2 Servitization innovation in different technology contexts

In this section, we will explain how servitization innovation is contingent upon the different technology contexts, namely in a pure manufacturing context or digital one. Technological innovation is an essential ingredient for servitization, either when manufacturing companies expand their products to service offerings, or digital technologies can be used by manufacturers to enable servitization process. Our data analysis of the literature suggests that digital technologies increasingly play a critical role in servitization innovation, such as Artificial Intelligence, Internet of Things, and

the Industry 4.0 movement. In the following, we will first discuss the manufacturing context, then followed by the digital context.

3.2.1 Manufacturing context

Along with the increases in sertivization research from the system organizational governance perspective, it suggests that integrated solutions business as the first generation of servitized offerings and modular solution offerings as the second development phase in servitization of original equipment manufacturers (Rajala, Brax, Virtanen, & Salonen, 2019). Although servitization literature largely originated in the European context to enhance the competitive advantage of European manufacturers, there has been some studies on servitization of Chinese counterparts. For instance, one study explored the servitization of Chinese manufacturing companies along the Belt and Road Initiative (Tan et al., 2019). Similarly, from the relational perspective, Chinese manufacturing companies can expand service offerings through different servitization strategies by pursuing cross-border mergers and acquisitions (Xing, Liu, Tarba, & Cooper, 2017).

Performance implication is an important component to understand servitization. The widely acknowledged 'servitization paradox' highlights the challenges that manufacturers need to overcome in order to benefit from servitization strategies and implementations. For example, one study examined this 'servitization paradox' by disentangling the value creation and value appropriation processes based on 44 national subsidiaries of a global manufacturing firm and found that manufacturer-turned product-service provider can deal with the substitution effect of products by services and to develop complementary sales dynamics between the two activities (Kastalli & Van Looy, 2013). One recent study found that organizational design and cultural factors as critical internal organizational elements can be leveraged to overcome the service paradox by the investigation of 207 Chinese manufacturing companies (Yan, Cheng, Li, & Wei, 2019). Furthermore, based on investigation of 50 Swedish manufacturing companies, relational governance strategies can enable superior financial performance of advanced service providers (Sjödin, Parida, & Kohtamäki, 2019). As for advanced services, such as the outcome-based service offerings, large manufacturing companies generate lower profits, while R&D investments moderate the negative relationship between scale and profitability (Korkeamäki, Kohtamäki, & Parida, 2021).

3.2.2 Digital context

Our analysis of the literature reveals that a significant increase in servitization research connecting with the digital context. We believe that the future of servitization research and servitization innovation will be largely influenced by the development of digital technologies and its associated consequences for manufacturing companies and their partners. Technological innovation studies have traditionally focused on examining the dynamics of innovation deployment in manufacturing firms, but they have neglected the increasingly important role of digital service innovation in manufacturing industries. Our study joins a recent movement that highlights the influence of technology contexts on servitization by considering digital service innovation as a new, technological innovation dimension (Bustinza et al. 2021). In so doing, it challenges the existing innovation frameworks by complementing the traditional technological innovation sources, namely process innovation and product innovation. One notable observation is the notion of digital servitization and its rapid development in the servitization literature (Struyf, Galvani, Matthyssens, & Bocconcelli, 2021). From the relational perspective one study examined how providers and customers transform their relationship to achieve benefits from digital servitization (Kamalaldin et al., 2020), while another study explored the perception of value delivered in digital servitization in a business-to-business context of manufacturing firms (Simonsson & Agarwal, 2021). From the organic perspective, some research focused on how organizational mechanisms (e.g. exploitation and exploration) (Coreynen,

Matthyssens, Vanderstraeten, & van Witteloostuijn, 2020) or resource configurations may drive digital servitization (Coreynen et al., 2017). From the system perspective, one study adopted a service ecosystem perspective to analyze interfirm and intrafirm change processes taking place as firms pursue digital servitization (Sklyar et al., 2019).

Several studies began to examine the complex intertwined relationship between servitization and digitalization. For instance, one study investigated the effect of the interaction between digitalization and servitization and found that from moderate to high levels of digitalization, the interplay between digitalization and high servitization becomes positive and significant, improving the financial performance of manufacturing companies (Kohtamäki, Parida, Patel, & Gebauer, 2020). Another study based on 257 manufacturing companies in China examined how two types of servitization—basic and advanced—interact with two types of digitalization—internal and external—in influencing the market performance of the focal manufacturer (Zhou, Yan, Dai, & Feng, 2021). Furthermore, one study based on 185 U.S. and European manufacturing firms found that digitalization and servitization had a direct positive effect on a firm's financial performance, while achieving superior financial results is contingent on the integration of the digital and service-specific capabilities (Abou-Foul, Ruiz-Alba, & Soares, 2021). There seems to be the emerging trend of converging digitalization and servitization. The convergence of digitization and servitization will be jointly determined by the intention and capability of companies shaping the developmental trajectory of servitization. It is not sufficient to have the willingness, but the ability to act upon opportunities holds the threshold where the convergence pathway may be steered ahead. Depending on the organization capability, industry life cycles and institutional contexts, divergence of digitization and servitization may also occur as an alternative pathway, as illuminated in the history-based study of servitization and deservitization (Gomes, et al, 2021).

To summarize the influence of technology contexts on servitization, Table 3 enlists the impact of manufacturing or digital context on three archetypes of servitization innovation with key concepts. Our observation suggests the important role of technologies and their implications can enable the realization of digital servitization, such as the Internet of Things-enabled opportunities for manufacturing companies (Naik, Schroeder, Kapoor, Bigdeli, & Baines, 2020), and the interplay between, and evolution of, digitalization and servitization (Chen, Visnjic, Parida, & Zhang, 2021).

=== insert Table 3 about here ===

3.3 An integrative framework on servitization innovation

Based on the analysis of the extant literature and the synthesis of the results, we hereby propose an integrative framework on servitization innovation by considering both the organizational governance perspective and technology contexts. As shown in Figure 3, servitization is driven by the motivation of the manufacturing companies to shift from the product-centric logic to customer-centric logic by incorporating a wide range of servitization options. The process through which manufacturing companies undertake can be labelled as the servitization strategy. From the organizational governance perspective, servitization may be governed and organized through either organic, relational, or system approaches. The outcome from the servitization process can be observed as the manifestations of servitization innovation. There can be a diversity and fragmentation of manifestations of servitization innovation as extant literature suggests and our analysis shows, such as territorial servitization, collaborative servitization, smart services, among others. However, theoretically, servitization innovation can be understood from these three perspectives, consisting of organic, relational, and system. Furthermore, the technology contexts can moderate the process through which servitization strategies can be implemented, especially either pure manufacturing context or digital one. The

technology contextual factor can shape the manifestations of servitization innovation. Nevertheless, organizational governance perspective provides an important and revealing theoretical underpinning to understand servitization innovation.

=== insert Figure 3 about here ===

4. Theoretical contributions

Our study makes three theoretical contributions to servitization research and innovation management literature by: (1) exploring the archetypes and manifestations of servitization innovation from the organizational governance perspective; (2) articulating the interaction between actors and mechanisms for servitization innovation by highlighting the different organizational forms and arrangements between manufacturing companies and services; (3) highlighting how the technology context may shape and influence the servitization innovation of manufacturing companies.

First, our findings she light on servitization innovation from the theoretical underpinnings of organizational governance adaptation (Klein et al., 2019). By systematically reviewing the vibrant servitization literature stream on servitization, our findings reveal three important architypes of servitization innovation, namely organic, relational, and system, that underpin the dynamics and development of servitization by strengthening the role of servitization governance and organizational adaptation. Our findings not only lend support to previous research on servitization that began to explore the governance of servitization, highlighting the important influence of platform governance (Jovanovic, Sjödin, & Parida, 2021) or relational governance (Sjödin et al., 2019), we also advance the servitization innovation literature by demonstrating that organizational governance constitutes as an important theoretical lens to understand and further develop a nuanced understanding of servitization innovation while drawing the recent knowledge from organization science. In doing so, we contribute to a nuanced understanding of servitization research by defining the notion of servitization innovation. Furthermore, our findings suggest that organizational governance perspective is an effective means whereby the extant servitization literature can be further advanced. At the core of this kind of conceptualization is the how and why servitization begins and the dynamic evolvement embedded in manufacturing companies. This finding lends further support to leveraging the transformational role of organizational design (Yan et al., 2019) in order to create, deliver and capture value from servitization. Our study may significantly expand the understanding of servitization innovation by highlighting the influence of organizational governance, in conjunction with the manufacturing industry's characteristics, through three distinctive organizing perspectives.

Second, our research contributes to obtaining a nuanced understanding of servitization innovation by articulating the interaction between actors and mechanisms. The important prevalence of servitization innovation in predicting servitization strategies and processes and the rather less contextualized understanding of it found in the extant literature necessitates a systematic literature review (Baines et al., 2017) investigation aimed at capturing the dynamics and nuances of servitization innovation. Our findings reveal three organizational arrangements of servitization innovation, theoretically rooted in the organizational governance adaptation literature (Klein et al., 2019), namely organic, relational, and system, by highlighting the different organizational forms and arrangements between manufacturing companies and services. This assists our endeavour to synthesize the body of knowledge and clarify commonalties and distinctive characteristics among different terminologies in relation to servitization (Zhang & Banerji, 2017). In connecting the organizational governance literature with servitization, our study extends the recent discussion on servitization by articulating the importance of organizational arrangement in interpreting and constructing organizational interactions

in servitization settings. By adopting such a nuanced approach to appreciating the servitization research and servitization innovation context, our findings offer additional insights into organizational governance literature (Sjödin et al., 2019). This finding lends further support to the contested nature and dynamics of organizational governance adaptation. Our study contributes to organizational governance by highlighting the impact of innovative approaches in the context of servitization. In so doing, it uncovers the multi-level phenomenon of servitization, specifically servitization innovation, to advance organizational governance research. Importantly, we attempt to offer an analytical framework theoretically rooted in organizational governance in order to understand the multifaceted nature and multi-level manifestation of servitization innovation.

Third, our study contributes to servitization innovation from a technology context perspective. Amid the rapid advancement and deployment of digital technologies, our comparative perspective between pure manufacturing context and digital context contributes to a nuanced understanding of how technology context may shape and influence the servitization strategies of manufacturing companies and their impact on servitization innovation. Specifically, our study joins the recent vibrant movement in digital servitization research (Struyf et al., 2021) and in the interplay of digitalization and servitization (Kohtamäki et al., 2020) by investigating the role of technology in the context of servitization innovation. The existing research on digital servitization has largely tended to focus merely on technology (Rymaszewska, Helo, & Gunasekaran, 2017); yet, it has failed to uncover the interactions and dynamics of organizational arrangements. Recent research has begun to demonstrate the complex interplay between digitalization and servitization and its impact on organizational performance (Abou-Foul et al., 2021). Thus, our results highlight the dynamics and complexity of servitization innovation involving organizational actors and technology contextual situations. Our study contributes to the servitization literature by considering digital service innovation as a new, technological innovation dimension. In doing so, our approach joins the recent scholarly movement in servitization literature (Opazo-Basaez et al. 2021) and challenges the existing innovation frameworks by expanding the traditional technological innovation sources, namely product innovation and process innovation. Furthermore, the rising phenomenon of digital multinationals may present new opportunities and challenges for servitization innovation, especially the digital globalization trend (Nambisan & Luo, 2021) and the digitization risks (Luo, 2021) can bring additional complexity in the digital contexts. The digital economy necessitates new configurational approaches and appropriate capabilities for servitization innovation to mitigate digital risk while benefiting multiple stakeholders in the process of value creation, delivery and capture. Furthermore, in relation to the importance role of capabilities and competence in digital economy and servitization innovation, our study highlights that digital economy contains more than just economic perspective, but also the capabilities and competencies that can affect the implementation of digital economy and digital service innovation in particular. In so doing, our findings can further advance the micro-foundation research by juxtaposing servitization and innovation research in the context of digital economy and technological development (Liu, 2020). The digital technologies are closely linked to the pathways by which servitization innovation may be realized, as our findings illuminated through the logic of organizing and ownership of the digital technologies by manufacturing companies, or partners. In connecting technology contexts with servitization innovation, our study contributes to the theoretical advancement of servitization innovation research by exploring the influence of contextual factors and clarifying the boundary conditions.

5. Practical and policy implications

This study has several implications for manufacturing companies, industrial practitioners and policymakers. First, manufacturing companies should pay close attention to organizational governance and to their influences in the pursuit of servitization. Throughout their servitization

journeys, manufacturing companies face challenges and opportunities, risk and uncertainties, which make servitization a challenging endeavour. Dealing with uncertainties and risk involved in servitization effectively requires manufacturing companies to make deliberate efforts and to leverage the support of resources and capabilities of their own and their partners. Importantly, manufacturing companies need to dedicate commitment to interacting with their partners and stakeholders. Through the process of interaction and collective activity, manufacturing firms may draw valuable resources from different constellation of servitization innovation in broader contexts.

Specifically, industrial practitioners who engage with servitization innovation need to leverage capabilities as a resource base suited to build and cultivate the appropriate competences towards servitization. Our research highlights that, for manufacturing companies, capabilities can play a crucial role in the pursuit of crafting servitization innovation while aiding in their implementation and performance implications. In fighting against the global COVID-19 health crisis and facilitating economic recovery globally (Liu, Lee, & Lee, 2020), managerial cognition and capabilities may provide useful resources that manufacturing firms could deploy in developing service-led growth to navigate through disruptive crises (Rapaccini, Saccani, Kowalkowski, Paiola, & Adrodegari, 2020). Collaborative partnership may strongly affect the development of servitization innovation, in turn affecting organizational performances. Our approach in analysing servitization literature from the organizational governance theory provides a coherent framework to identify, synthesize and connect with different research activities and themes in servitization research. Building upon the importance of capabilities and micro-foundation in innovation research (Liu & Huang, 2018; Liu, 2020), we argue that servitization may generate resilience for innovation and offer certain degree of organizational slack to deal with disruption and global economic uncertainty. In particular, companies can remain resilient by using digital technologies in implementing servitization strategy in the context of global loose coupling (Nambisan & Luo, 2021).As for policymakers, both national and local governments tend to resort to servitization and innovation for regional economic development and revitalization, especially in the traditional industrial regions (Gomes et al., 2019). The focus on promoting and developing regional economy should not ignore the industry contexts. Manufacturing companies under certain conditions would welcome to option to partner with service providers in order to accelerate the servitization process (Bustinza et al., 2021). Against the Industry 4.0 movement and technological advancement in digital technologies, digital infrastructure requests large scale investment and long-term orientation in decision-making of policymakers. Also, the paradigm shift from product-centric logic to a customer-centric logic in various servitization innovation settings requires different types of policy and business support beyond the conventional industry policy. However, the technological advancement might generate negative consequences for the workplace when not being carefully designed, used or managed. For instance, technology would replace human beings and make the traditional repetitive jobs redundant (Vrontis, et al, 2022). The interactions between human and machines can lead to daunting challenges for human workforce, especially when the human side factors (Liu, et al, 2017) are considered. Additionally, technological advancement may amplify or reduce the complexity of organizational design and arrangement (Del Giudice, et al. 2021). For instance, blockchain technology is essentially decentralized (Lumineau, Wang & Schilke, 2021), but the mechanisms to ensure trust and control may complicate the organizational governance, highlighting the drawbacks or shortcomings of technology, especially from the servitization innovation perspective. We argue that governments may systematically design and implement servitization policy initiatives to cultivate the new knowledge and skillsets, and may integrate them into existing occupational training and education.

6. Limitations and additional directions for future research

Systematic literature review can generate theoretical insights through synthesis of the extant literature beyond the empirical settings of any particular study, such as the impact of AI on workplace (Pereira, Hadjielias, Christofi, & Vrontis, 2021) or marketing and international competitiveness (Vrontis, Christofi, & Katsikeas, 2020). Nevertheless, the systematic literature review method is still relatively new in comparison to other different ways of conducting literature reviews, such as meta-analysis or narrative review (Fan, et al, 2022). By engaging with the evidence-based management conversation (Briner, et al, 2009), our study may generate a more nuanced understanding of systematic literature review and its importance in review methodology. There are several fruitful research directions that can build upon our analysis of the literature to investigate servitization innovation through the theoretical lens of organizational governance. First, we suggest that performance implications from servitization can be investigated from a comparison of different archetypes of servitization innovation. The existing research pointed out that servitization paradox may hinder manufacturing companies to engage in servitization, while technologies may help to unpack the paradox. We argue that organizational governance can provide a revealing and insightful perspective to understand under what conditions servitization may improve financial performance and which architypes of servitization innovation may generate most favourable performance outcomes under certain circumstances.

We suggest that the organizational governance theory can offer an important theoretical perspective to understand servitizaiton innovation and performance implications in particular. For instance, 'make or buy/ally' is fundamental to understand configurational approaches in product-service ecosystems and organizational interactions in servitization while collaboration with service providers in certain types of business services can increase performance (Bustinza, Lafuente, Rabetino, Vaillant, & Vendrell-Herrero, 2019). Furthermore, inspired by recent work on servitization and deservitization from a history-based framework (Gomes, et al, 2021), we encourage future scholarly inquiry to consider integrating industry life cycles with organizational governance theories to advance servitization research.

Second, our systematic analysis on servitization innovation highlights the influence of capabilities on the organizational design and implementation of servitization in enhancing competitive advantages and their interplay with organizational governance in the manufacturing companies' servitization context. Future work is encouraged to adopt a micro-foundational perspective (Christofi et al., 2021c) to identify and examine other micro-foundations of servitization. For instance, previous research had documented the emerging yet nascent literature on capability development for servitization (Beltagui, 2018; Story et al., 2017). Thus, a nuanced understanding of the influence of micro-foundations on servitization innovation awaits future scholarly inquiry. A micro-foundational perspective in connection with organizational governance and servitization innovation may generate revealing insights for future scholarly inquiry. In so doing, it may generate an enhanced understanding of the complex interactions between and among manufacturing companies and service providers.

Third, we argue that international dimension may offer additional important understandings to advance servitization innovation. Increasingly, several recent studies began to examine servitization in international contexts. Notably, one study shows direct and mutually reinforcing positive effects of hybrid offering (i.e. combined product-service offer) and firm internationalization (i.e. foreign production and sales) on the adoption of monitoring capabilities (Vendrell-Herrero et al., 2021). Cross-fertilization between the literature streams of international business, innovation (Christofi, Iaia, Marchesani, & Masciarelli, 2021a; Liu, Collinson, Cooper, & Baglieri, 2021) and servitization may hold great promise to gain more nuanced understandings of servitization innovation and servitization performance. A comparative internationally-oriented research agenda may also facilitate the identification of the commonalities and distinctive characteristics of servitization innovation across different geographical, technological, socio-cultural, and institutional contexts.

7. Conclusions

The objective of this work was to shed light on servitization innovation from an organizational governance perspective and provide a coherent theoretical underpinning for future research. By systematically reviewing the servitization literature and focussing on servitization innovation, which we defined as the innovative approaches by which servitization is organized and governed, this research achieved this objective and provided novel insights into innovation pathways for servitization from the organizational governance perspective, namely organic, relational, and system. Juxtaposing the different organizational forms and arrangements between manufacturing companies and service providers advances our understandings of the interactions between actors and mechanisms for servitization innovation and provides a unified lens through which future research can be conducted. By suggesting that a nuanced understanding of the role played by technology context is important to advance servitization research and practice, our research provides an important lens through which to understand servitization innovation for academia and for facilitating practitioners in implementing servitization. In a nutshell, our study shows the importance of leveraging organizational design in servitization innovation, considers manufacturing characteristics, and provides insight into how digital technologies shape the developmental trajectory of servitization innovation and the complex interplay of digitalization and servitiztion.

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Table 1. Inclusion and exclusion criteria

	Inclusion/Exclusion criteria	Justification
Article selection	Only articles published in journals listed under the CABS disciplinary headings: Marketing, Operations and Technology Management, Innovation, General Management, Strategy.	This did not affect our SLR as articles outside these disciplines are not considered to be active on the topics of interest nor are they considered to actively address the topic of servitization from an innovation perspective.
	Articles were not excluded based on CABS ranking.	Some key research on servitization has been published lower ranked journals.
	Written English articles only. Non journal outputs (e.g., books, book chapters, conference papers) were excluded.	Given the volume of journal articles, and the fact book chapters and conferences proceedings are commonly transferred into journal articles, we did not expect this to affect the outcome of our search.
	Article selection was to include conceptual and empirical work.	There are significant pieces of work that are conceptual in nature and relevant to this literature review.
Time bounds of the search	January 1st 2010 to December 1st 2021 (10 years 11 months).	This timeframe was deemed appropriate as digital servitization research and research focussing more specifically on innovation for servitization did not emerge in great volume until after this period.

Table 2. A typology of servitization innovation from the organizational governance theoretical perspective

Servitization Innovation	***Definition***	***Key concepts***	***Representative studies***
Organic	the innovative approach by which servitization innovation stems from manufacturing companies themselves	Basic services, Advanced services, Product-service systems, New service development Smart services	Baines & Lightfoot (2013) Burton, Story, Raddats, & Zolkiewski (2017) Morgan, Anokhin, & Wincent, (2019) Sousa & da Silveira (2017)
Relational	the innovative approach by which servitization innovation emerges from the collaboration between manufacturing companies and collaborative partners	Collaborative partnership Alternative servitization, Territorial servitization, Service network Service suppliers	Lafuente, Vaillant, & Vendrell-Herrero (2017) Gomes, Bustinza, Tarba, Khan, & Ahammad (2019) Weigel & Hadwich (2018) Ayala, Paslauski, Ghezzi, & Frank (2017)
System	the innovative approach by which servitization innovation occurs in a broader system context that involves manufacturing companies and multiple stakeholders	Platform Ecosystem	Cenamor, Sjödin, & Parida (2017) Thomson, Kamalaldin, Sjödin, & Parida (2021) Parida, Burström, Visnjic, & Wincent (2019) Kapoor, Bigdeli, Schroeder, & Baines (2021)

Table 3. Technology contexts and servitization innovation

Technology contexts	***Organic Servitization Innovation***	***Relational Servitization Innovation***	***System Servitization Innovation***
Manufacturing context	integrated solutions business modular solution offerings product-service provider	KIBS Mergers and acquisitions Supplier-partner Relational governance strategies	Territorial servitization (on regional level)
Digital context	Own digital technology power for digital servitization Smart services	Technology suppliers Big data analytics AI company IoT company Digital servitization through partners	Digital-enabled platform Product-service ecosystem Digital servitization through system Interplay between digitalization and servitization

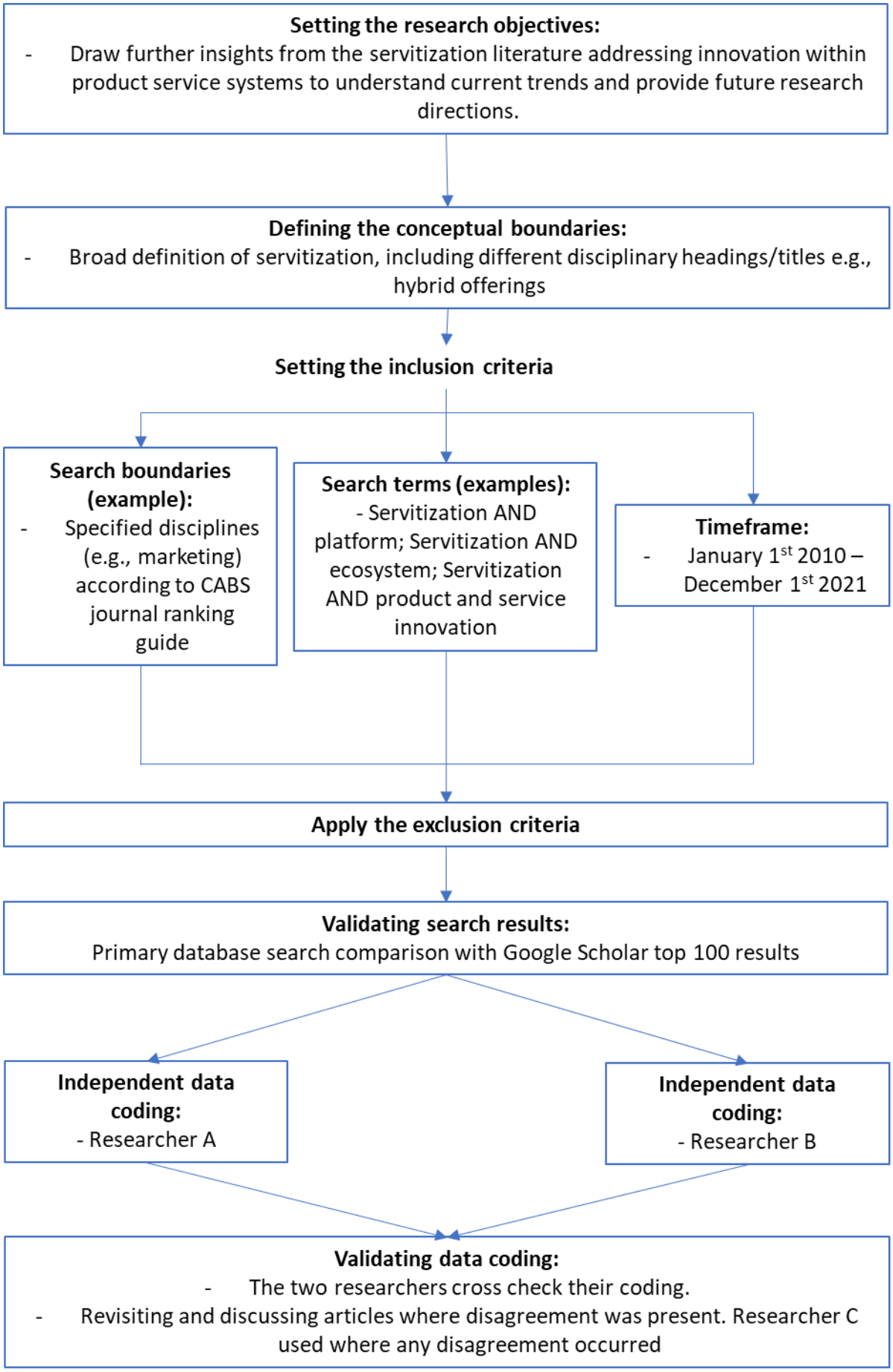


Figure 1. SLR Overview (adapted from Wang & Chugh, 2014)

Figure 2 Distribution of servitization innovation studies according to the organizational governance theory

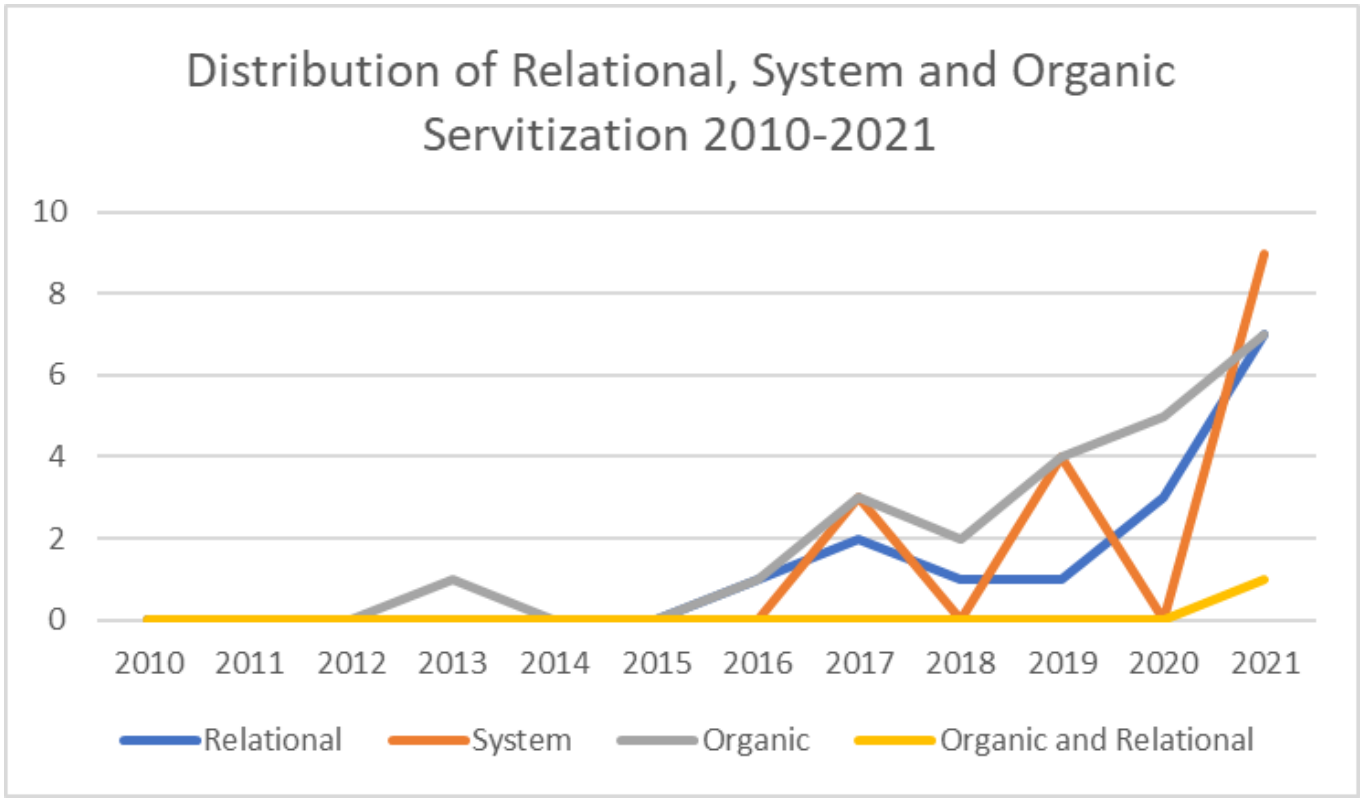
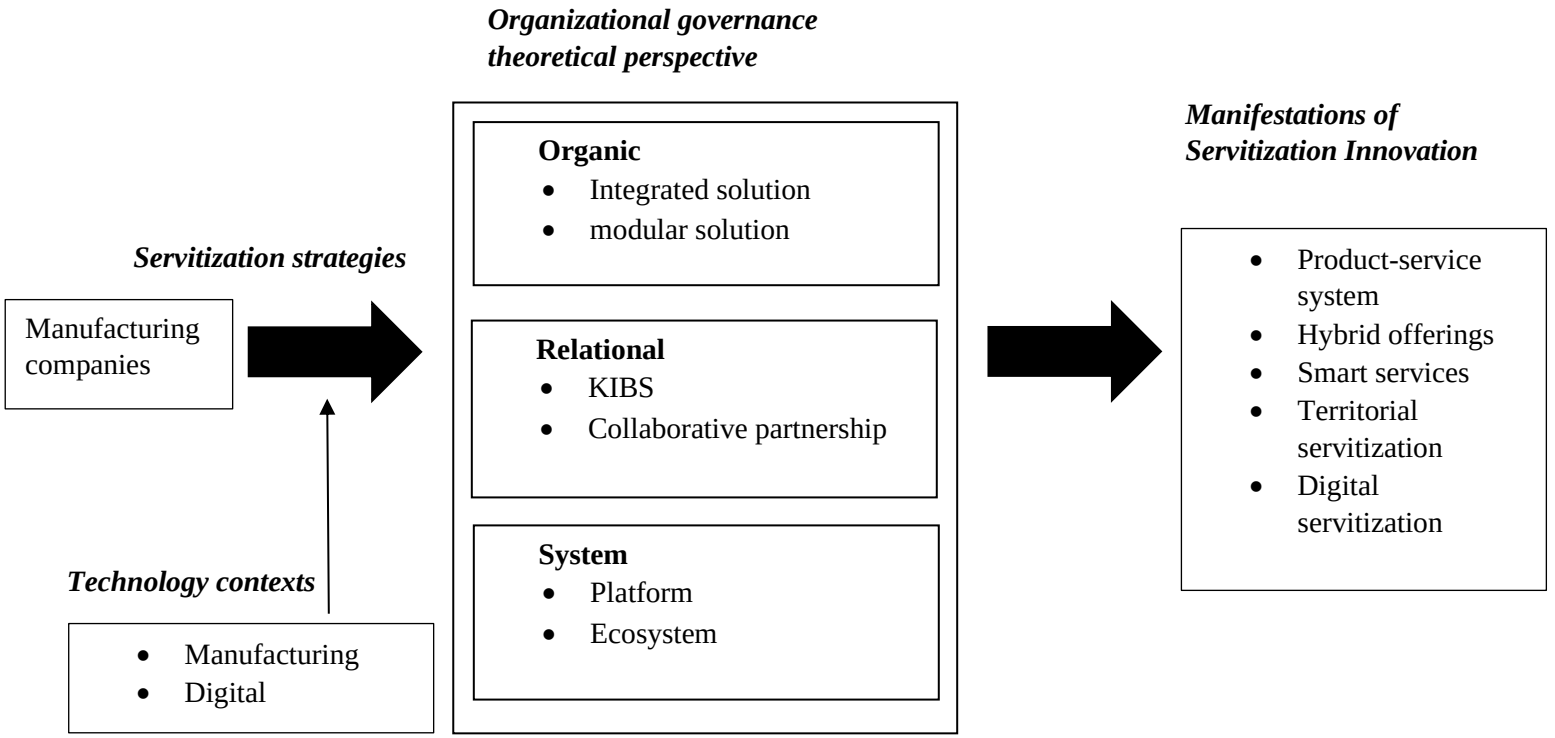


Figure 3 An integrative framework on servitization innovation



Appendix: Sample of the data extraction sheet

The appendix provides a sample of the data extraction sheet. The purpose of the table is to provide transparency in the research process. The paper ID number of each paper was given after the analysis when research papers were grouped against their primary theme (e.g., their archetype). Further sample information provided includes the analysed papers research strategy and the conceptual underpinning of the research. Not specified is when the paper was not explicit in its conceptual underpinning.

Paper ID Number	Reference	Primary Theme	Research strategy	Conceptual Underpinning
1	Abou-foul, M., Ruiz-Alba, J. L., & Soares, A. 2021. The impact of digitalization and servitization on the financial performance of a firm: an empirical analysis. *Production Planning and Control*, 32 (12): 975–989.	Organic	Survey	Capabilities and firm performance
2	Beltagui, A. 2018. A design-thinking perspective on capability development: The case of new product development for a service business model. *International Journal of Operations and Production Management*, *38*4: 1041–1060.	Organic	Case study	Business model innovation and design thinking
3	Burton, J., Story, V. M., Raddats, C., & Zolkiewski, J. 2017. Overcoming the challenges that hinder new service development by manufacturers with diverse services strategies. *International Journal of Production Economics*, *192 (*January): 29–39.	Organic	Case study	New Service Development (NSD)
4	Coreynen, W., Matthyssens, P., & Van Bockhaven, W. 2017. Boosting servitization through digitization: Pathways and dynamic resource configurations for manufacturers. *Industrial Marketing Management*, *60:* 42–53.	Organic	Case study	Dynamic capabilities, resource-based view
5	Coreynen, W., Matthyssens, P., Vanderstraeten, J., & van Witteloostuijn, A. 2020. Unravelling the internal and external drivers of digital servitization: A dynamic capabilities and contingency perspective on firm strategy. *Industrial Marketing Management*, (December): 265–277.	Organic	Survey	Dynamic capabilities

6	Kohtamäki, M., Parida, V., Patel, P. C., & Gebauer, H. 2020. The relationship between digitalization and servitization: The role of servitization in capturing the financial potential of digitalization. *Technological Forecasting and Social Change*, *151*.	Organic	Survey	Digitalisation paradox
7	Korkeamäki, L., Kohtamäki, M., & Parida, V. 2021. Worth the risk? The profit impact of outcome-based service offerings for manufacturing firms. *Journal of Business Research*, *131 (*March): 92–102.	Organic	Secondary data analysis	Not specified
8	Kharlamov, A. A., & Parry, G. 2021. The impact of servitization and digitization on productivity and profitability of the firm: a systematic approach. *Production Planning and Control*, *32 (*3): 185–197.	Organic	Secondary data analysis	Not specified
9	Linde, L., Frishammar, J., & Parida, V. 2021. Revenue Models for Digital Servitization: A Value Capture Framework for Designing, Developing, and Scaling Digital Services. *IEEE Transactions on Engineering Management*, 1–16.	Organic	Case study	Not specified
10	Morgan, T., Anokhin, S. A., & Wincent, J. 2019. New service development by manufacturing firms: Effects of customer participation under environmental contingencies. *Journal of Business Research*, *104 (*June): 497–505.	Organic	Survey	Attention based view
11	Martín-Peña, M. L., Sánchez-López, J. M., & Díaz-Garrido, E. 2020. Servitization and digitalization in manufacturing: the influence on firm performance. *Journal of Business and Industrial Marketing*, *35*3: 564–574.	Organic	Survey	Not specified
12	Naik, P., Schroeder, A., Kapoor, K. K., Ziaee Bigdeli, A., & Baines, T. 2020. Behind the scenes of digital servitization: Actualising IoT-enabled affordances. *Industrial Marketing Management*, *89:* 232–244.	Organic	Case study	Affordance theory
13	Paiola, M., Schiavone, F., Khvatova, T., & Grandinetti, R. 2021. Prior knowledge, industry 4.0 and digital servitization. An inductive framework.	Organic	Case study	Business model innovation

	Technological Forecasting and Social Change, 171 (October).			
14	Qi, Y., Mao, Z., Zhang, M., & Guo, H. 2020. Manufacturing practices and servitization: The role of mass customization and product innovation capabilities. *International Journal of Production Economics, 228 (March).*	Organic	Survey	Resource based view
15	Rajala, R., Brax, S. A., Virtanen, A., & Salonen, A. 2019. The next phase in servitization: transforming integrated solutions into modular solutions. *International Journal of Operations and Production Management*, *39*5: 630–657.	Organic	Case study	Resource based view and modularity theory
16	Sousa, R., & da Silveira, G. J. C. 2017. Capability antecedents and performance outcomes of servitization: Differences between basic and advanced services. *International Journal of Operations and Production Management*, *37*4: 444–467.	Organic	Survey	Manufacturing strategy
17	Sjödin, D., Parida, V., and Kohtamäki, M. 2016. Capability configurations for advanced service offerings in manufacturing firms: Using fuzzy set qualitative comparative analysis, *Journal of Business Research,* 69 (11): 5330-5335.	Organic	Fuzzy Set Qualitative Comparative Analysis	Resource based view
18	Sjödin, D., Parida, V., & Kohtamäki, M. 2019. Relational governance strategies for advanced service provision: Multiple paths to superior financial performance in servitization. *Journal of Business Research, 101 (*June): 906–915.	Organic	Fuzzy Set Qualitative Comparative Analysis	Relational theory
19	Tan, K. H., Ji, G., Chung, L., Wang, C. H., Chiu, A., & Tseng, M. L. 2019. Riding the wave of belt and road initiative in servitization: Lessons from China. *International Journal of Production Economics*, *211 (*May):15–21.	Organic	Case study	Co creation and technology mapping

20	Visnjic, I., Neely, A., & Jovanovic, M. 2018. The path to outcome delivery: Interplay of service market strategy and open business models. *Technovation*, *72–73 (*December): 46–59.	Organic	Case study	Business model change and market strategy
21	Visnjic Kastalli, I., & Van Looy, B. 2013. Servitization: Disentangling the impact of service business model innovation on manufacturing firm performance. *Journal of Operations Management*, *31*4: 169–180.	Organic	Secondary data analysis	Economies of scale and scope
22	Vendrell-Herrero, F., Bustinza, O. F., & Vaillant, Y. 2021. Adoption and optimal configuration of smart products: The role of firm internationalization and offer hybridization. *Industrial Marketing Management, 95 (February):* 41–53.	Organic	Survey	Hybrid firms and digital servitization framework
23	Yan, K., Cheng, T. C. E., Li, G., & Wei, Z. 2021. Overcoming the Service Paradox by Leveraging Organizational Design and Cultural Factors: A Combined Configuration and Contingency Approach. *IEEE Transactions on Engineering Management*, *68*2: 498–512.	Organic	Survey	Configurational theory and contingency theory
24	Zhou, D., Yan, T., Dai, W., & Feng, J. 2021. Disentangling the interactions within and between servitization and digitalization strategies: A service-dominant logic. *International Journal of Production Economics*, 238: 108175.	Organic	Survey	Service dominant logic
25	Ayala, N. F., Paslauski, C. A., Ghezzi, A., & Frank, A. G. 2017. Knowledge sharing dynamics in service suppliers' involvement for servitization of manufacturing companies. *International Journal of Production Economics*, 193: 538-553.	Relational	Case study	Business model innovation and knowledge sharing
26	Gomes, E., Bustinza, O. F., Tarba, S., Khan, Z., & Ahammad, M. 2019. Antecedents and implications of territorial servitization. *Regional Studies*, *53*3: 410–423.	Relational	Secondary data analysis	Knowledge Intensive Business Services and regional development

27	Huikkola, T., Kohtamäki, M., Rabetino, R., Makkonen, H., & Holtkamp, P. 2021. Overcoming the challenges of smart solution development: Co-alignment of processes, routines, and practices to manage product, service, and software integration. *Technovation*, (*January)*.	Relational	Case study	Organisational routines, NSD and new product development (NPD)
28	Kamalaldin, A., Sjödin, D., Hullova, D., & Parida, V. 2021. Configuring ecosystem strategies for digitally enabled process innovation: A framework for equipment suppliers in the process industries. *Technovation, (January)*	Relational	Case study	Ecosystem strategy
29	Kohtamäki, M., Rabetino, R., Einola, S., Parida, V., & Patel, P. 2021. Unfolding the digital servitization path from products to product-service-software systems: Practicing change through intentional narratives. *Journal of Business Research*, *137:* 379–392.	Relational	Case study	Organisational change and practice theory
30	Kamalaldin, A., Linde, L., Sjödin, D., & Parida, V. 2020. Transforming provider-customer relationships in digital servitization: A relational view on digitalization. *Industrial Marketing Management*, (November): 306–325.	Relational	Case study	Relational theory
31	Mosch, P., Schweikl, S., & Obermaier, R. 2021. Trapped in the supply chain? Digital servitization strategies and power relations in the case of an industrial technology supplier. *International Journal of Production Economics*, *236*August 2020, 108141. https://doi.org/10.1016/j.ijpe.2021.108141	Relational	Case study	Resource dependency theory
32	Rondi, E., De Massis, A., & Kraus, S. 2021. Servitization through open service innovation in family firms: Exploring the ability-willingness paradox. *Journal of Business Research*, *135:* 436–444.	Relational	Review	Open innovation and organisational ambidexterity
33	Simonsson, J., and Agarwal, G. 2021. Perception of value delivered in digital servitization. *Industrial Marketing Management*, *104 (*June): 507–516.	Relational	Survey	Individual entrepreneurial orientation and

				Business model innovation
34	Struyf, B., Galvani, S., Matthyssens, P., & Bocconcelli, R. 2021. Toward a multilevel perspective on digital servitization. *International Journal of Operations and Production Management*, *415:* 668–693.	Relational	Case study	Multi-level theory
35	Sjödin, D., Parida, V., & Wincent, J. 2016. Value co-creation process of integrated product-services: Effect of role ambiguities and relational coping strategies. *Industrial Marketing Management*, *56:* 108–119.	Relational	Case study	Service dominant logic and value co-creation
36	Sjödin, D., Parida, V., Kohtamäki, M., & Wincent, J. 2020. An agile co-creation process for digital servitization: A micro-service innovation approach. *Journal of Business Research*, *112*March, 478–491. https://doi.org/10.1016/j.jbusres.2020.01.009	Relational	Case study	Value co-creation and digitalisation paradox
37	Story, V. M., Raddats, C., Burton, J., Zolkiewski, J., & Baines, T. 2017. Capabilities for advanced services: A multi-actor perspective. *Industrial Marketing Management*, *60:* 54–68.	Relational	Case study	Resource based view
38	Tronvoll, B., Sklyar, A., Sörhammar, D., & Kowalkowski, C. 2020. Transformational shifts through digital servitization. *Industrial Marketing Management*, *89:* 293–305.	Relational	Case study	Organisational culture
39	Weigel, S., & Hadwich, K. 2018. Success factors of service networks in the context of servitization – Development and verification of an impact model. *Industrial Marketing Management*, *74* (June): 254–275.	Relational	Survey	Relational theory
40	Bustinza, O. F., Lafuente, E., Rabetino, R., Vaillant, Y., & Vendrell-Herrero, F. 2019. Make-or-buy configurational approaches in product-service ecosystems and performance. *Journal of Business Research*, *104 (*September): 393–401.	Ecosystem	Fuzzy Set Qualitative Comparative Analysis	Make-or-buy and core capabilities

41	Cenamor, J., Sjödin, D., & Parida, V. 2017. Adopting a platform approach in servitization: Leveraging the value of digitalization. *International Journal of Production Economics*, *192(* December): 54–65.	Ecosystem	Case study	Platform ecosystems and modularity theory
42	Chen, Y., Visnjic, I., Parida, V., & Zhang, Z. 2021. On the road to digital servitization – The discontinuous interplay between business model and digital technology. *International Journal of Operations and Production Management*, *41*5: 694–722.	Ecosystem	Case study	Business model change
43	Ciasullo, M. V., Polese, F., Montera, R., & Carrubbo, L. 2021. A digital servitization framework for viable manufacturing companies. *Journal of Business and Industrial Marketing*, *36 (*13): 142–160.	Ecosystem	Case study	Service dominant logic and viable systems approach
44	Eloranta, V., Ardolino, M., & Saccani, N. 2021. A complexity management approach to servitization: the role of digital platforms. *International Journal of Operations and Production Management*, *41*5: 622–644.	Ecosystem	Theory adaptation	Complexity management
45	Gebauer, H., Saul, C. J., Haldimann, M., & Gustafsson, A. 2017. Organizational capabilities for pay-per-use services in product-oriented companies. *International Journal of Production Economics*, *192 (*December):157–168.	Ecosystem	Case study	Knowledge based view and business model innovation
46	Jovanovic, M., Sjödin, D., & Parida, V. 2021. Co-evolution of platform architecture, platform services, and platform governance: Expanding the platform value of industrial digital platforms. *Technovation*, (*January)*.	Ecosystem	Case study	Platform architecture, ecosystems and governanace
47	Kapoor, K., Bigdeli, A. Z., Schroeder, A., & Baines, T. 2021. A platform ecosystem view of servitization in manufacturing. *Technovation*, (*January)*.	Ecosystem	Case study	Socio-technical systems theory and platform ecosystems
48	Lafuente, E., Vaillant, Y., & Vendrell-Herrero, F. 2017. Territorial servitization: Exploring the virtuous circle connecting knowledge-intensive services and	Ecosystem	Survey	Knowledge intensive business services and

	new manufacturing businesses. *International Journal of Production Economics*, *192 (*December): 19–28.			territorial servitization
49	Paiola, M., Schiavone, F., Grandinetti, R., & Chen, J. 2021. Digital servitization and sustainability through networking: Some evidences from IoT-based business models. *Journal of Business Research*, *132*November 2020, 507–516. https://doi.org/10.1016/j.jbusres.2021.04.047	Ecosystem	Case study	Business model innovation
50	Parida, V., Burström, T., Visnjic, I., & Wincent, J. 2019. Orchestrating industrial ecosystem in circular economy: A two-stage transformation model for large manufacturing companies. *Journal of Business Research*, *101 (*January): 715–725.	Ecosystem	Case study	Business ecosystems
51	Sklyar, A., Kowalkowski, C., Sörhammar, D., & Tronvoll, B. 2019. Resource integration through digitalisation: a service ecosystem perspective. *Journal of Marketing Management*, *35:* 974–991.	Ecosystem	Case study	Service ecosystems and tie strengths
52	Sklyar, A., Kowalkowski, C., Tronvoll, B., & Sörhammar, D. 2019. Organizing for digital servitization: A service ecosystem perspective. *Journal of Business Research*, *104 (*February): 450–460.	Ecosystem	Case study	Service ecosystems
53	Thomson, L., Kamalaldin, A., Sjödin, D., & Parida, V. 2021. A maturity framework for autonomous solutions in manufacturing firms: The interplay of technology, ecosystem, and business model. *International Entrepreneurship and Management Journal*.	Ecosystem	Case study	Business models and ecosystems
54	Tian, J., Coreynen, W., Matthyssens, P., & Shen, L. 2021. Platform-based servitization and business model adaptation by established manufacturers. *Technovation*, (*December)*	Ecosystem	Case study	Business models

55	Bustinza, O. F., Opazo-Basaez, M., & Tarba, S. 2021. Exploring the interplay between Smart Manufacturing and KIBS firms in configuring product-service innovation performance. *Technovation*: 102258.	Organic and Relational	Survey	Knowledge intensive business services and smart manufacturing