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# Advancement of services: implications for the reconfiguration of service supply chain structures

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## Abstract

**Purpose** – This study aims to explore how an organisation’s ability to offer advanced services to customers and users depends on – and shapes – the supply chain configuration through a constellation of intra- and inter-organisational actors and ties.

**Design/methodology/approach** – The study involved three qualitative case studies of organisations in different types of markets and supply chain positions offering both basic and advanced services: a material-handling equipment manufacturer, a wearable medical technology supplier and a digital care platform developer. Data were organised by scope (i.e. direction and number of ties) and scale (i.e. frequency of interaction and number of contact points) to operationalise the supply chain structure.

**Findings** – Mapping of the cases revealed that the actors and structures of the supply chain were altered as products were replaced with services supporting products, and in turn, services supporting customers (SSCs). As service offerings advanced, the number of ties between actors increased, as did the number of contact points and frequency of interactions with customers.

**Originality/value** – In response to the rise of SSCs and their implications for service supply chains, this study clarifies how intra- and inter-organisational actors and ties reconfigure when firms advance their service offerings. Moreover, empirical illustrations from three service-intensive organisations with different service offerings and digitalisation levels showcase variations in customer interactions in supply chains.

**Keywords** Service supply chains, Advancing services, Customer, Actors, Ties

**Paper type** Research paper

## 1. Introduction

With service-led growth and the development of new service offerings (Raja *et al.*, 2018), organisations have been pressured to improve their engagement with customers (Petri and Jacob, 2016) and service supply chains (Altuntas Vural, 2017). Firstly, an organisation must assess its current service-oriented approaches (Bustinza *et al.*, 2013), how service offerings affect its supply chains (Finne and Holmström, 2013; He *et al.*, 2016) and actors’ involvement in value co-creation endeavours (Skålén and Gummerus, 2023). Secondly, by understanding service advancements in supply chains, organisations can avoid becoming “subsystem suppliers” without direct customer contact (Finne and Holmström, 2013) and rather use the potential of digitalisation to enhance customer interaction and feedback for further service advancements (Gremyr *et al.*, 2022). Thirdly, with advanced offerings, customers and users are not limited to receiving value, rather they actively co-create

it (Sampson and Spring, 2012; Petri and Jacob, 2016; Sousa and da Silveira, 2017).

In this study, we examine service advancement by focusing on the move from solely offering products, to services supporting products (SSPs) and then to services supporting customers (SSCs) in their internal operations (Mathieu, 2001; Coreynen *et al.*, 2017). SSPs focus on product functionality, which is often standardised, with an emphasis on enhancing product performance through a smooth service delivery process (Mathieu, 2001). In SSCs, the focus shifts to enhancing customers’ internal operations, advancing service delivery from point-of-sale to point-of-use systems and requiring providers to deliver unique value and interact more directly with customers

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and users (Sousa and da Silveira, 2017). Despite the rise of SSCs and the call for research to uncover their implications for service supply chains (Gremyr and Halldórsson, 2021), there is limited research on how advanced service offerings affect supply chains (Finne and Holmström, 2013). Specifically, the focus on customers as active co-creators of services (e.g. providing feedback in direct interaction with a supplier) has been proposed as a future research area to enhance current understanding of service supply chain mechanisms (Gremyr and Halldórsson, 2021). Within this research area, there is a need to further understand customers in service supply chains (Sampson and Spring, 2012; Altuntas Vural, 2017) and how these systems are designed to suit the actors involved and related interactions (Bikfalvi *et al.*, 2013). Research on service innovation has often focused on the specific outcomes of new offerings (Chandler *et al.*, 2019), yet it fails to clarify pertinent processual factors (Vargo *et al.*, 2023) and how information (e.g. feedback) flows between actors in digital service supply chains (Davies *et al.*, 2023).

Seizing this research opportunity, we explore how an organisation's ability to offer advanced services to customers and users depends on – and shapes – the supply chain configuration through a constellation of intra- and inter-organisational actors and ties. The following two research questions are posed:

*RQ1.* Firstly, how are the constellations of intra- and inter-organisational actors altered by service advancement?

To address this question, a conceptual framework is developed to capture the interactions between actors and their ties as organisations advance their service offerings (from products to SSPs and then to SSCs) in the context of intra- and inter-organisational relationships in the supply chain (Gummerus *et al.*, 2021). This conceptual framework systematically captures the complexity of service supply chains when advancing service offerings; for example, in terms of the increased number of ties between suppliers and customers (Sousa and da Silveira, 2017). The second research question is as follows:

*RQ2.* How are interactions between providers and customers and users influenced by service advancements?

By elucidating the fit between the supply chain structure and type of services offered, this study furthers current understanding of supplier and customer relationships as influential ties on supply performance (Vanichchinchai, 2021), especially in times of digitalisation impacting customer interactions (Gremyr *et al.*, 2022).

This study makes three main contributions to the literature. Firstly, by exploring the transformation of supply chain configurations for products to SSPs and then to SSCs, this study provides a processual perspective (Vargo *et al.*, 2023), that complements the mainstream research on service innovation, which has often focused on specific outcomes of new offerings (Chandler *et al.*, 2019). Secondly, we map three cases at different stages of the supply chain with varying degrees of digitalisation, adding to the limited number of studies on digital service supply chains and how digitalisation impacts

information flows (e.g. feedback) between actors (Davies *et al.*, 2023). Thirdly, we present a graphical illustration of customer interactions, which highlights changes in the number of ties between actors, number of contact points and frequency of interactions with customers. As such, examining service offerings from service-intensive organisations provides detailed insights into variations in customer interactions in supply chains, responding to the call for research on the use of customer-related knowledge across service contexts (Nätti and Ojasalo, 2008).

The remainder of this paper is organised as follows. Section 2 presents a literature review and introduces a conceptual framework for advancing services in supply chains. Section 3 outlines the research methods, followed by analysis of three case studies in Section 4. The results and their implications for theory and practice are discussed in Section 5 and suggestions for future research are provided in Section 6.

## 2. Literature and conceptual framework

The focus of our conceptualisation is on advancing services in relation to supply chain configuration, with emphasis on the impact on actors and their relations; accordingly, we draw on supply chain management and industrial marketing literature to understand the interplay between advancing service offerings and service supply chain configurations. Firstly, to capture service advancements, this study draws on the literature that classifies services into various types of offerings, such as products, SSPs and SSCs (Mathieu, 2001) and explores their influence on customer interactions. Secondly, the literature on service supply chains forms the basis for conceptualising service supply chain configurations. Thirdly, these two research areas form the basis of the conceptual framework underlying analysis of the empirical data.

### 2.1 Advancing service offerings

In service value creation processes, the business model is reoriented from products to results (Tukker, 2004) and the relational dimension shifts focus from transactions to relationships inherent in the transition towards more advanced offerings (Penttinen and Palmer, 2007; Sousa and da Silveira, 2017). According to Sousa and da Silveira (2017), *basic services* are product-centred and based on transactional contractual relationships (i.e. selling products), which do not add much value for customers and involve little interaction with them. By contrast, *advanced services* are service-centred and differentiated by relational contractual relationships (i.e. selling solutions as part of long-term relationships), influencing customers' value creation processes and involving significant customer interaction, engagement and co-creation. Given that customers are always involved in value production, where successful co-creation is achieved through personalised and joint value creation experiences (Vargo and Lusch, 2004), becoming co-creators of value and engaging in customer value creation can be challenging for organisations that have traditionally focused on their role as providers. This is also challenging for the professionals on the provider side that play a critical role in facilitating co-creation and whose changing roles with enhanced customer interaction might require new training and support (Maijala *et al.*, 2025). Thus, co-creating value with

customers requires organisations to handle more complexity in both the offerings *per se* and in customer interactions and relations (Bolton *et al.*, 2018; Kohtamäki *et al.*, 2021). Drawing on Grönroos and Voima (2013), value creation is operationalised along three spheres: provider, joint and customer spheres. The underlying view is that while customers are the sole creators of value, it can be jointly co-created through interactions between customers and providers.

In people-oriented sectors such as healthcare, the way services are offered affects the willingness to participate in care service co-creation (Osei-Frimpong *et al.*, 2020). For example, interactive health communication application programmes provide supportive information, education, communication and coaching services (Badr *et al.*, 2015; Bouma *et al.*, 2015), facilitating decision-making and promoting lifestyle changes. As service advancement is provisioned in supply chains, organisational structures must be reconfigured within organisations or in relation to external partners (Bikfalvi *et al.*, 2013), considering the types of offerings in combination with the degree of customer contact and front- and back-end activities (Raja *et al.*, 2018).

## 2.2 Service supply chains

A service supply chain refers to a network of suppliers, providers and customers that exchange the resources required to produce and deliver services. Exchanges in service supply chains are bidirectional: customers not only receive resources from service providers but also provide them for service production (Sampson and Spring, 2012). Thus, enhancing communication with and feedback from customers (Hall *et al.*, 2022) and engaging them in co-creation enhances value and also support innovations and service advancements (Peltier *et al.*, 2020). Moreover, service supply chains are not constant structures (Gremyr and Halldórsson, 2021) but can be seen as reconfigured service systems influenced by changes in the actors and their interactions during service advancement (Gummerus *et al.*, 2021).

For instance, Coreynen *et al.* (2017) underscored the dynamism of servitisation by investigating the dynamic resource configuration imposed by digitalisation. Hsuan *et al.* (2021) explored digital servitisation journeys by configuring product-service-software offerings and showed that mapping the advancement of services (ranging from basic to advanced) facilitates managerial decisions regarding how digitalisation (through software development) should be coupled with products and/or services, as well as the required allocation of resources over time. Moreover, customer interaction increasingly relies on direct relationships as organisations reorient themselves from products to digitally enabled product-service offerings (Martinez *et al.*, 2010; Löfberg and Åkesson, 2018; Gremyr *et al.*, 2022). This reorientation effort imposed by digitalisation requires firms to closely examine their supply chain capabilities (e.g. synergistic alignment, adaptive restructuring, collaborative innovation, digital networks, digital integration and digital intelligence) and configurations that can enhance their competitive performance (Li *et al.*, 2025). As digital technology continues to be embedded in the products and services of manufacturing firms, coupling digital technology with products and/or services will potentially

establish new supply chain networks, such as digital supply chains (Queiroz *et al.*, 2021).

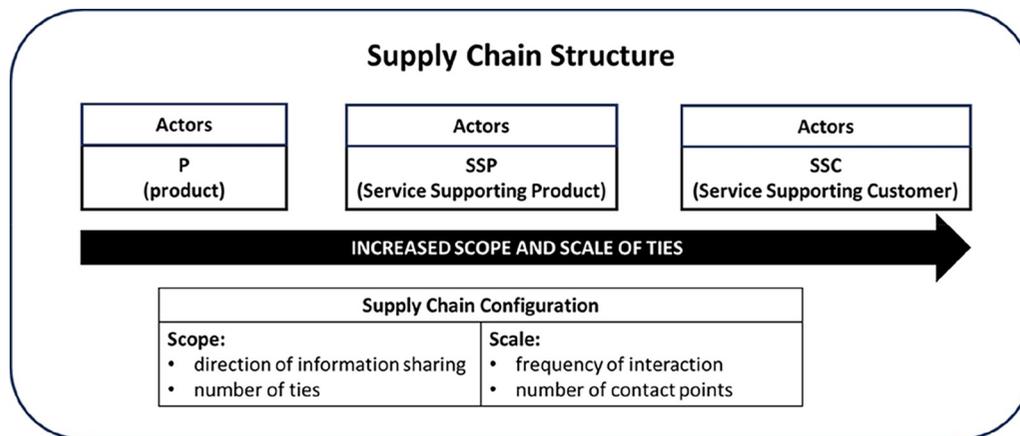
Lambert and Cooper (2000) depicted the supply chain structure in terms of managed processual links that the focal organisation deems important. Inter-firm relationships can be conceptualised in terms of interaction points between organisations. When there is only one interaction point where all information transmission and communication occur (e.g. buyer and seller), the relationship follows a transaction-based arm's length approach. When more functions are allowed to communicate with each other and externally, the relationship becomes more partnership-based, as more contact points between customers and an array of customer-interacting personnel (Sousa and da Silveira, 2017) are created inter-organisationally. Such dynamics enforce bidirectional relationships between actors (Sampson, 2000; Sampson and Spring, 2012), which cast customers into the additional role of suppliers of essential resources for service providers.

Traditionally, digitalisation of supply chains refers to operations (e.g. automation) or transparency and real-time monitoring through advanced information technology (Baycik and Gowda, 2024). Advancing services, however, entails the introduction of new and often digitally connected services (Birch-Jensen *et al.*, 2020) that can accommodate greater flexibility and adaptation in customer-provider relationships, thereby changing the complexity of relationships and interactions among actors and consequently reshaping supply chain configurations. Advancements in digitalisation and information technologies play a crucial role in shaping supply chain configurations. Open software platforms (e.g. Android) have enabled exponential growth in the customisation and personalisation of services and expanded the scope and scale of actors and ties throughout supply chains, subsequently supporting increased supply chain transparency among actors. It changes the nature of relationships, as value co-creation with customers and users is enhanced by more direct interactions with them (Altuntas Vural *et al.*, 2019).

## 2.3 A Conceptual framework for actors' interaction in service supply chains

In characterising the supply chain as an agile constellation of actors involved in transitioning towards advanced service offerings, Eloranta and Turunen (2015, p. 414) urged a refocus from focal organisations towards "combining a larger set of actors in agile ways", as enhanced collaborations between actors enhance performance benefits in a supply chain (Hall *et al.*, 2022). In addition, there is a need to position customers as a focal point for service supply chains to strengthen value creation in both the short and long term (Altuntas Vural, 2017). Thus, service supply chains are reconfigured because of frequent network rearrangements when advancing services, moving away from the linear chain-based logic common in manufacturing (Spring and Araujo, 2013).

To capture these reconfigurations, the service supply chain structure is described using two structural attributes: actors and ties. Figure 1 illustrates the interplay between actors and ties in shaping the advancement of supply chain services. Multiple actors interact by shifting from a provider-centric to a user-centric perspective, where customers and users are key actors, especially when their inputs are used as resources in service provision and

**Figure 1** Conceptual framework: advancing services in the context of supply chains

Source: Authors' own work

advancement. *Ties* link actors in supply chains through interactions at contact points, which are strengthened or weakened as organisations shift from products to SSPs and then to SSCs. Firstly, as service interaction is partly external to the focal organisation, key stakeholders – suppliers, original equipment manufacturers, customers and users – comprise a larger set of actors that warrant more focus than a single organisation (Maglio and Spohrer, 2013). Secondly, actors assume different responsibilities in service supply chains (Sampson and Spring, 2012; Wynstra *et al.*, 2015; Gummerus *et al.*, 2021). For example, systems integrators constitute the “prime contractor organisation responsible for the overall system design and integrating product and service components supplied by a variety of external suppliers into a functioning system” (Davies *et al.*, 2007, p. 184). This reflects how the complexity of service supply chains arises from the focal firm’s bidirectional relationships with multiple actors (Sampson and Spring, 2012). Thirdly, in service supply chains, actors form long-term, bidirectional *ties* (Sampson, 2000; Sampson and Spring, 2012), rather than transactional ones. This difference influences the transformation towards more advanced services (e.g. Martinez *et al.*, 2010; Eloranta and Turunen, 2015), as it prescribes an approach based on long-term relationships (Martinez *et al.*, 2010).

Inter-organisational ties link two actors in the supply chain and are portrayed in terms of relationships (Altuntas Vural *et al.*, 2019). In services, customers are also the suppliers of essential resources to service providers. In their conceptualisation of service architecture, Voss and Hsuan (2009) emphasised the role of interfaces (or ties) in the configuration of supply chains in service organisations. At the supply chain level, ties manage the supply chain configuration and boundaries of firms, such as outsourcing (Mikkola, 2003). At the level of the firm (which provides the offerings), ties are associated with the management of front- and back-office activities (Zomerdijk and Vries, 2007). For instance, to achieve effective service outsourcing, clear knowledge of the process architecture of services and the ties between them is required. From an intra-organisational perspective, a focus on ties provides a richer understanding of front- and back-office activities and how service organisations deal with customer service.

To capture the complexity embedded in supply chain configurations in advancing services, the characteristics of ties are operationalised based on scope and scale (Table 1). Scope defines the number and direction of ties (unidirectional or bidirectional). Scale defines the strength of ties (or strength of relationships) shared between two actors, determined by the frequency of interaction and number of contact points.

### 3. Research methods

Multiple case studies were analysed to explore how advanced service offerings influence and shape supply chains. This study aims to show how supply chain configurations in varying contexts can be operationalised when configuring the service supply chain for advanced services, progressing from product (P) to SSPs and then to SSCs. As this study is exploratory and focuses on a contemporary phenomenon, using multiple case studies allows for the generation of multiple observations of simultaneous and complex dynamics (Gioia *et al.*, 2013; Eisenhardt and Graebner, 2007), which are particularly useful for unveiling detailed insights into a theoretically novel phenomenon (Edmondson and Mcmanus, 2007). The three cases examined in the study are separate organisations representing different positions in their respective supply chains. (1) Materials Inc. develops and manufactures material-handling equipment, operates in a business-to-business market and is positioned upstream in the supply chain. (2) MedTech Inc. develops a wearable medical technology product, operating in a business-to-business market positioned downstream, where traditionally, only one actor (a clinic) operated between them and the product users. (3) Digital Care provides a digital care platform specifically for patients with cancer, operating downstream in a business-to-user market with direct user contact. Each case provides insights into the particularities and nuances of their organisations in navigating advanced services in diverse settings. As organisations come from different sectors, the labelling of actors differs to reflect each unique context. Here, the customer is defined as the individual paying for the service and the user as the individual

Table 1 Scope and scale of the supply chain structure

Direction	Supply chain structure	
	Scope	Scale
Unidirectional: Information is shared from one actor to another in transactional relationships (e.g. outsourcing of assembly and offshoring)	Denotes the variety of modes of communication transfer, channels and mechanisms  (e.g. product catalogues, help desk, websites, apps, telephone calls, emails and face-to-face encounters)	Denotes how often two actors communicate about the same topic via a given mode or channel of communication transfer
Bidirectional: Information is shared by actors in strategic partnerships that allow co-creation and co-development		Reflects the actor's centrality conceptualised as the number of contact points it has to manage or control

Source(s): Authors' own work

using it (noting that customers and users can sometimes be the same actor).

### 3.1 Sampling and empirical context

Purposive (Flick, 2014; Creswell and Plano Clark, 2007) and heterogeneous sampling (Van de Ven, 2007) set the boundaries for this study, ensuring that the contexts included service-intensive but heterogeneous organisations that emphasised the users of both their products and services (Baxter and Jack, 2008). Besides the previously described variety regarding market type and supply chain position, case selection was guided by four criteria:

- 1 organisations with experience in both *basic services* and *advanced services*;
- 2 organisations that had in-use services, allowing explorations of the interplay between service offerings and supply chain configuration;
- 3 organisations positioned at different stages of service supply chains; and
- 4 organisations with different levels of digitalisation, which is considered critical for supply chain configurations (Coreynen *et al.*, 2017).

The cases were selected and analysed for instrumental purposes (Baxter and Jack, 2008), as each case contributes to understanding the impact of advancing services in different contexts. These contexts differ not only in terms of offerings but also in whether they operate in a business-to-business or business-to-user market, as well as the organisation's position in the supply chain – upstream or downstream. As advanced services are often described as a means of approaching users and becoming actively involved in co-creating value for them (Mathieu, 2001), the differences in supply chain position allow us to further investigate the impact of upstream SSCs, from the point of use and back to the multi-actor structure delivering into the particular SSC. While sampling organisations from various positions in the same supply chain reduces the influence of contextual factors, selecting organisations from different supply chains enables a richer understanding of changes in supply chain configurations, moving beyond the assumptions of linear interactions. Table 2 provides an overview of the contextual characteristics of each case, including the offerings and key actors in the supply chain. The framework developed from this

methodological approach can be classified under variety theory (Van de Ven, 2007), which identifies multiple pathways through which service advancement can lead to structural shifts and, hence, variety in supply chain configurations.

### 3.2 Data collection

Data from three distinct case studies were retrieved and analysed. For MedTech Inc. and Materials Inc., cross-sectional data were gathered through interviews with respondents working with aftermarket offerings for manufacturing firms, all of whom had experience interacting with end users during the period of use. For each of these cases, respondents identified a specific instance of recent service advancement at the time of the study (i.e. 2017). The interview guide was thematically structured around the transition from P through SSPs and towards SSCs and the resulting supply chain reconfiguration, using a visual map during the interview and asking questions about “actors” and “ties” based on the theoretical framework. Data for Digital Care were collected from evaluations of two pilot studies conducted in 2016 and 2017 during the platform's development phase, in which patients provided feedback on technical aspects and functionality through surveys, interviews and focus group discussions. This study was conducted in compliance with the current ethical standards of the authors' affiliated institutions. No personal data related to patients' medical conditions were collected; thus, according to Swedish law, the study is exempted from formal approval from the national ethics board, only needed when research “entails the processing of sensitive personal data or personal data” (Swedish Ethical Review Authority, 2023, p. 65).

The selection of key informants at MedTech Inc. and Materials Inc. was facilitated by a senior manager in each organisation who was experienced in and responsible for both services and customer-facing units. In total, seven interviews were conducted, each lasting approximately 60–90 min. At MedTech Inc., five interviews were conducted with four respondents:

- 1 an aftermarket manager;
- 2 a product owner responsible for service offerings;
- 3 a complaint manager; and
- 4 a risk and quality engineer.

**Table 2** Characteristics of the case organisations, their offerings and their supply chain

Area	Materials inc.	MedTech inc.	Digital care
<b>Current supply chain position</b>	Upstream on a business-to-business market	Downstream on business-to-business market	Downstream on a business-to-user market
<b>Digitalisation</b>	Technical digitalisation, primarily mechanical	High-tech, digital products	Digital services
<b>Products (P)</b>	Materials handling equipment used in warehouses. Standalone products supporting transportation of materials	Wearable medical technology device that is prescribed by clinics to patients with a chronic disease. The product is surgically attached to the body	A medical care plan where patients basic information, the legislated medical chart and standardised patient information are provided
<b>Service(s) supporting products (SSP)</b>	Care package (i.e. maintenance) with services that focus on optimal product functionality leading to handling efficiency and warehousing optimisation	On-call product support through clinics, help in enhancing product functionality	Support from an assigned contact nurse to understand and use a printed version of My care plan (MCP) that enables healthcare staff to gather all information in one place and channel information through the contact nurse
<b>Service(s) supporting customers (SSC)</b>	Support with health and safety of the operators of the material handling equipment, e.g. through training that focuses on an efficient and safe work environment for the operators (users)	Mobile app that enables the user to independently adjust settings of the device to support their needs	Digital care plan for patient communication and interaction, contains both standardised and personalised medical information, as well as healthcare contact information that can be activated by the patient when needed
<b>Key actors in the supply chain</b>	Provider (i.e. sales, aftermarket and training) Customer (i.e. buyer) User Competitors' users	Provider (i.e. aftermarket, sales and development) Clinic Users	Provider (i.e. nurse, physician and rehabilitation staff) Patient Contact nurse

Source(s): Authors' own work

The second interview with the aftermarket manager focused on details of previous responses and confirmed the preliminary findings. At Materials Inc., two interviews were conducted with the vice president of products and manufacturing and one director of sales, complemented by reviews of online information and service descriptions. For Digital Care, data were collected during the evaluation of two pilot studies. Pilot A was conducted on a Web-based platform, whereas for Pilot B, we used a mobile application. In Pilot A, a total of 23 patients and 11 contact nurses tested the prototype for 20 weeks. The evaluation included 17 diary surveys, seven individual interviews and a focus group meeting with participating contact nurses and the pilot team. Fifteen surveys and four telephone interviews were conducted. In Pilot B, an application for end users was developed and tested in two units (surgical and oncological) for women with breast cancer. The application was downloaded onto each patient's mobile phone or computer, with each receiving a user login. Nine patients were interviewed individually after the test period, with interviews lasting between 15 and 60 min. Four contact nurses participated in a 60-min focus group interview. Across all three cases, data were collected from 20 interviews, one focus group and 17 diary surveys.

### 3.3 Data analysis

The analysis was conducted in several steps to identify commonalities and differences across cases. Firstly, a graphical display in the form of a network diagram (Miles *et al.*, 2020) was created for each case. These initial diagrams were produced by the author responsible for the respective case, based on the

conceptual framework (see Section 2.3). Thus, three of the authors took responsibility for one case each, which entailed drafting the first version of the storyline, however further steps of the within-case analysis were carried out jointly by all authors. The fourth author acted as an external investigator, reviewing the diagrams and interpretations, thereby strengthening the trustworthiness of the findings (Eisenhardt, 1989).

Secondly, the diagrams were refined iteratively during the interviews. Respondents were invited to comment on and adjust the diagrams as they reflected on their answers, which led to the further development of ties and actor configurations over the course of data collection. Thus, the network diagrams functioned simultaneously as elicitation tools in the interviews and as analytic displays. The coding process combined deductive and inductive strategies and was conducted jointly by the authors. In deductive coding, we applied the predefined dimensions of supply chain configuration (scope and scale) and four related characteristics (direction, number of ties, frequency of interaction and number of contact points), as defined in Table 1. In parallel, inductive coding was used to capture emergent subcodes – for example, how ties were established through specific modes of communication. The coded data were fed into the evolving network diagrams, which thus served not only as representations but also as analytic devices.

Thirdly, within-case analysis was conducted by retaining the storyline of each case, rather than fragmenting the data into isolated categories or themes (Boyatzis, 1998; Miles *et al.*, 2020). This approach helped preserve the narrative structure of

each case while using the diagrams as a tool to highlight key developments of the supply chain configurations throughout service advancement.

Finally, cross-case analysis was conducted collaboratively by all four authors. The three case diagrams were compared and jointly refined through discussion and examples. Taken together, this process contributed to graphical representations (network diagrams of actors and their ties before and after service advancement from P to SSPs and then to SSCs) that visualised the shifts in supply chain configurations, as shown in Figure 2.

**3.4 Research quality**

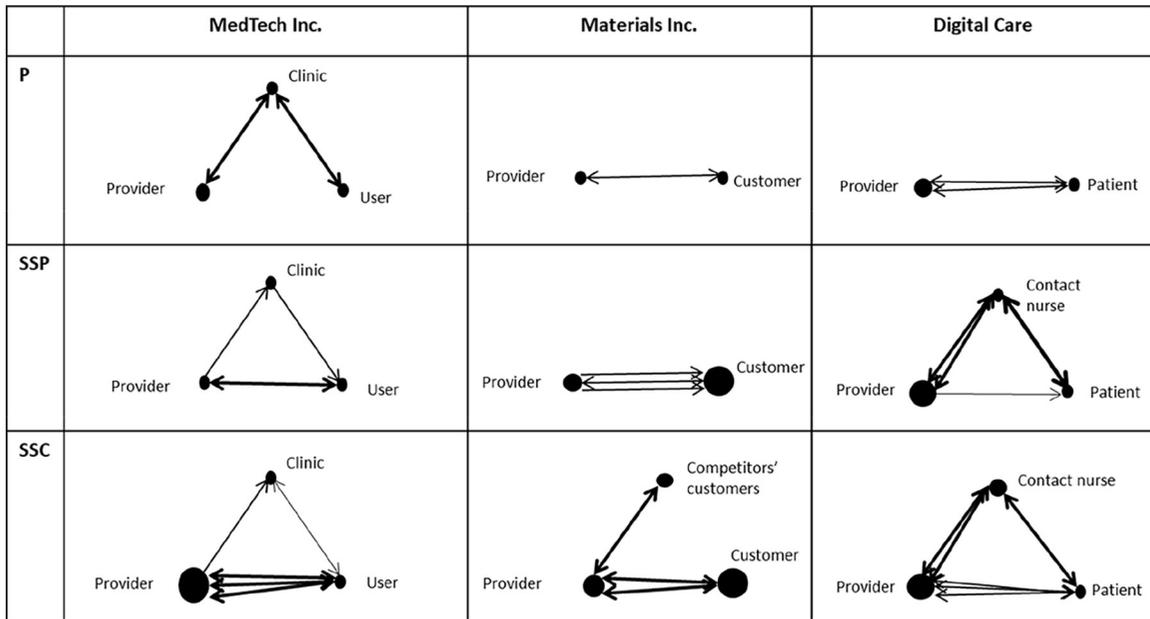
Credibility was ensured through an iterative process in which interactions with respondents during data collection were followed by respondent confirmation of the preliminary results. For example, in the cases of MedTech Inc. and Materials Inc., the top managers who provided access to the organisation were not only interviewed but also approached during data analysis for discussions and to confirm preliminary results in an anonymised form focusing on the graphical representations developed. Transferability was enhanced by scrutinising the empirical context and its variety, as exemplified by the retrieval of secondary data from Web pages describing Materials Inc.’s

offerings. These efforts were supplemented by purposively sampling diverse organisations from different parts of the supply chain and multiple respondents therein. To support dependability, notes were taken on the processes and respondent interactions and a processual structure was followed for pilot evaluations with Digital Care. Confirmability was achieved by documenting the interviews and maintaining transparency throughout the iterative processes of data coding and analysis. Finally, to improve the trustworthiness of the results, our analysis included triangulation of data from multiple sources within a team of researchers, adopting multiple theoretical perspectives and with varying levels of involvement in data collection (Eisenhardt, 1989).

**4. Results**

The results are presented separately for MedTech Inc., Materials Inc. and Digital Care, followed by a comparison of the three cases. For each organisation, the advancement of their service offerings and shifting supply chain configurations are described. The comparison enables analysis of the number of ties between actors, number of contact points and frequency of customer interactions.

**Figure 2** Shifts in supply chain configurations in the three cases



Source: Authors’ own work

#### 4.1 MedTech Inc.

MedTech Inc.'s products are sold to approximately 150,000 users through an internal sales office that serves four regional markets worldwide. The product is based on a technical innovation that was initially unique to the market, although the patent has since expired. Nevertheless, the organisation remains the market leader, mostly because of its product's leading technical functionality. To remain competitive, it has developed various services for its core offering, designed to support product use (e.g. on-call product support) and assist users in their daily lives (i.e. setting adjustments via mobile applications).

MedTech Inc. relies on numerous key actors:

- clinics that diagnose user health (i.e. customers);
- users who need the device; and
- those who pay for the product, which can include governmental organisations, insurance companies or, in very few cases, the users themselves.

Users do not have direct contact with MedTech Inc. Instead, the clinics (customers) act as intermediaries. When users have complaints, they contact a clinic, which in turn contacts the company's sales office. For complaints that cannot be resolved during the interaction between the sales office and clinic, the sales office staff register the complaint in a formal complaint-handling system. As explained by the aftermarket manager, "If a corrective and preventive action should be done, it has to be demanded by the aftermarket function and approved by the management group. Such actions range from redesigning a product already on the market to issuing a new product brochure". Thus, if a product or supplement (e.g. manual) needs to be redesigned, the management team must be informed and evaluate whether corrective or preventive action is needed.

Regarding MedTech Inc.'s SSPs – namely, on-call product support – users can call a specialist about the device or diagnosis to obtain advice on enhancing product functionality or solving simpler problems. As the service is provided for free, the purchaser is removed from the interactions, making the clinic's role more passive (i.e. providing information to the user that the service exists). By contrast, the sales office, where the specialists are based, engages directly with the user and assumes an active role. Complaints or comments about the service do not reach the aftermarket group but are regarded as a "regional sales matter" (aftermarket manager).

SSCs, designed to support users' everyday lives, are new to MedTech Inc. and have been developed primarily in response to competition. Simultaneously, users sought a discreet way of managing their devices, which motivated the development of a mobile application that allowed them to independently adjust their product settings. As the application is offered for free, the purchaser is not involved in its provision. Similarly, for product support, the application requires the clinic (customer) and user to interact, albeit not via the sales office, but directly with the development organisation. If problems arise that the clinic cannot resolve, the clinician can directly contact the product owner responsible for the application, together with the user. The clinic can file a formal complaint, even if it rarely occurs. The aftermarket function is not directly involved in handling complaints; instead, it is used "to help escalate the problem to

the management team as a means to get resources for corrective actions" (aftermarket manager). Finally, users can contact the product owner directly via email or anonymously through comments posted on the Apple Store and/or Google Play.

#### 4.2 Materials Inc

Materials Inc.'s European branch produces over 11,000 material-handling equipment products annually, delivered through wholly owned sales subsidiaries. More than half of the company's turnover is service based; that is, it is related to revenue streams other than physical products. The firm's competitive edge does not depend much on price but on support services, which include maintenance, energy efficiency, handling efficiency and health and safety.

All the products sold by Materials Inc. are tailored to customer orders, and the company does not maintain a stock of finished goods. Devoted to providing customer-specific solutions, Materials Inc. focuses on providing unique value, seeking "to deliver something other than simply selling steel to our customers" (vice president of products and manufacturing). Rather than offering a catalogue of standardised products, Materials Inc.'s representatives visit customers before sales to understand their operations and needs. After relaying these needs to the R&D and manufacturing teams, an offer is made to the customer. As expressed by the vice president of products and manufacturing, "customisation [of the products] is performed by the technicians who visit the customers, then fed back to the R&D and production teams".

The SSPs offered by Materials Inc. are treated according to the principle of the total cost of ownership (TCO) of the product. For customers, the cost of acquiring the product is only a fraction of the TCO; maintenance accounts for a third, while the cost of operating the equipment comprises more than half of the TCO. According to the director of sales at Materials Inc., "the product is nothing without a high-performing user". Consequently, services that support improved efficiency of the product in use and enhance customer operations (e.g. warehousing efficiency) have become essential. Typical SSPs range from full-maintenance packages to *ad hoc* visits by service engineers, who form the firm's largest staff category. Most on-call problems can be resolved during a customer's initial visit and engineers boast a 98% on-time delivery rate for spare parts to the company's service vans. The process is partly automated; a sensor in the equipment monitors and collects data about usage, which serve as input for planned maintenance. In addition, customers can contact Materials Inc. directly via a dedicated service engineer instead of a centralised call centre, despite the firm's large international customer base. SSPs aim to improve handling efficiency in customer warehouses, which involves at least three types of interaction between the firm and its customers. Firstly, as part of the standard offering, customers generally receive guidelines on how to operate the equipment. Secondly, Materials Inc. provides advice on energy efficiency and preventive maintenance. Thirdly, an expert from Materials Inc. conducts logistics analysis at the customer's warehouse to assess whether changes in layout or processes would allow for more effective equipment use.

Equipment operations require frequent, repetitive physical movements, which can impact the physical well-being of the

operator over time. Materials Inc. prioritises the health and safety of its product users; thus, ergonomic solutions have long been factored into its value propositions. Accordingly, the company has established a European training centre that offers programmes for operators (SSCs), focusing on the relationship between efficiency and health, safety and ergonomics. Along with a certificate to operate the equipment, users receive training in both handling and operational efficiency, with follow-up training offered after two or three years to maintain and develop their skills. As emphasised by the sales manager, this SSC focuses on enhancing the operations of both customers and users, as the certificate issued is also “valid for other brands of material handling equipment”, thus not focusing on solely supporting the functionality of Material Inc.’s products.

### 4.3 Digital care

Digital Care operates as part of a 2011 national strategy that stipulates 10 criteria for improving the quality and equality of cancer care in Sweden. Addressing patients (users), in particular, requires an individual care plan to be developed for each patient so that they feel safe, informed and involved in their care; the “My Careplan” (i.e. MCP) is thus proposed. Each patient’s MCP, developed and applied from their own perspective, should include information that patients consider paramount and thus complement the legislated patient medical chart and standardised patient information. Although some MCP content is specified – including information about patients’ rights, dates and times, emergency contact names and numbers, support and advice during and after treatment and a summary of treatment – the key question of every MCP is, “What is most important for you today?” A recommendation has also been the integration of a cancer rehabilitation plan into the MCP. Apart from patients (users), actors used by health care (customers) include contact nurses (i.e. nurses responsible for patients diagnosed with the same type of cancer), physicians and rehabilitation staff (e.g. physiotherapists, social workers and dieticians).

Traditionally, the best evidence-based practices for cancer care have been produced and presented to patients as written information, which is developed by medical experts (customers) and adapted to suit the regional organisation of care. Each person diagnosed with cancer requiring further investigation is notified by letter or phone to schedule an appointment with the physician responsible for the case. The clinic can be reached at specified times via telephone or the staff working there may contact the patient. If a patient is being examined or treated in multiple hospital units (i.e. urology and oncology), the units may not automatically interact and the patient may have to seek answers to specific questions without guidance from a particular unit. No specific nurse is assigned to each patient; instead, the nurse on duty who takes the call also makes arrangements for the patient. Interaction between patients and physicians is mediated only via nurses’ questions during telephone calls with the patients or physicians’ findings during a pre-book consultation. Patients have little say about their care and limited interactions with care providers.

In 2011, when the emerging role of contact nurses was established in Sweden, nurses were assigned to coordinate the care of each patient diagnosed with cancer. The patient’s sole point of contact with the care provider – the contact nurse – attends multi-

professional meetings within the cancer care team (surgeons, oncologists, radiologists, pathologists, physiotherapists, etc.), performs needs assessments and evaluations and attends the patient’s appointments with physicians whenever possible. The focus is on making care flow efficiently (i.e. SSP) and to support this, the patient is assigned a contact nurse who provides the MCP in a paper format. However, even if the contact nurse system facilitates patient (user) access to cancer care teams, the contact nurse remains the mediator for most other contacts. This nurse also collects information from the patient through dialogue that is later relayed to the team. Thus, although the patient can initiate an interaction, it is activated only after the contact nurse has interpreted the input.

The MCP-based digital platform allows patients to manage the communication related to their care via a digital tool in a way and time that is most convenient to them (SSC). As stated by a patient (user), “the advantage is that everything I need to know is in the same place and easily accessible”. Predefined information is provided as documents in the tool and individual information can be added by the contact nurse or another member of the care team. Standardised information, identical to that previously offered in brochures or leaflets, is more easily updated or changed than the print version. Being digital, the shift in power (from staff to patients) that was initiated in SSPs is enhanced; with the SSC (the digital tool), patients can communicate directly with their contact nurses or other team members without waiting for their next appointment: “Sometimes you [as a patient] have questions that aren’t urgent enough to make a call for, but you still want to ask them before your next visit” (patient/user). Patients can also customise their own MCPs, including timelines of planned actions and use self-evaluation tools (e.g. distress thermometers and other patient-reported outcome measures) available online before or during interactions with team members. Using self-evaluation tools can help patients and staff quickly identify the most suitable team members to offer support. For additional medical evaluations, such as of side effects following chemotherapy, results from such tools can be presented as graphs for patients to view patterns of their health status or side effects and plan additional activities accordingly. The digital platform is designed to provide access to various features in a single login, including patients’ online medical records and a booking system for healthcare needs unrelated to their cancer diagnosis.

### 4.4 Comparison of the cases

The ability to work with advanced services depends on the particular actors involved and how the ties between them are managed. In all three cases, the supply chain configuration shifted when products advanced into SSPs and SSCs. [Figure 2](#) depicts a comparison of the various types of offerings studied, referencing the supply chain configuration operationalised in terms of the direction of relationships, number of ties between actors, frequency of interactions and number of contact points (as described in Section 2.3).

As the organisations began to offer increasingly advanced services, three key changes emerged for all three cases: increases in the number of ties between actors, number of contact points and frequency of interactions with customers. Firstly, shifting from offering products to SSCs increased the number of inter-organisational ties between actors.

Specifically, the product supply chain was characterised by well-defined ties, often between salespeople at the provider level and their counterparts in the customers' purchasing department. Offering co-created services increased the number of ties. For example, at Materials Inc., SSPs focusing on efficiency in customer premises have forged many new ties. Some were provider-driven (e.g. guidelines on equipment handling and advice on energy efficiency), whereas others were *ad hoc* (e.g. logistics analysis requiring personal interaction). *Ad hoc* services require a Materials Inc. employee to spend several weeks in the customer organisation and interact with operations personnel and managers to discuss improvement-oriented efforts. Similarly, the MCP enabled patients (users) to send messages online at any time, despite knowing that responses would be delayed, which opened up a new channel for healthcare (providers).

Secondly, the number of contact points increased intra-organisationally, particularly at the provider end. For example, when MedTech Inc. started offering an application-based SSC, the organisation was unprepared for direct feedback from users to product owners, as it was assumed that users would continue to contact their clinics (customers). However, the rather straightforward link to the market via the aftermarket and sales functions was complemented by many others, including online feedback, crash reports to application developers and calls to both clinics and sales offices. At Materials Inc., offering education on users' health and safety opened up more contact points at both the provider and customer ends. At the provider end, the training centre and its staff experienced a new, relatively formalised interaction between a dedicated unit at Materials Inc. and the users, both of which were complementary and novel to the interaction concerning products and SSPs. By contrast, at the customer end, new contact points emerged not only for purchasers and managers but also for users of the equipment.

Thirdly, the frequency of intra-organisational interactions involving both customers and users increased, as witnessed by MedTech Inc. and Materials Inc., facilitated by digitalisation. In the case of Digital Care, the SSCs currently in place have led to a similar increase in the frequency of interaction, as patients (users) take control of and activate resources in healthcare via direct contact with care team members, including but not restricted to their contact nurses. In other words, digital MCP allowed patients to shift from relying on suggested plans to being more actively involved in creating and applying plans. For MedTech Inc., the app-based service significantly increased the frequency of interactions with both clinics (customers) and users and reduced the time allotted for processing complaints. Both trends have highlighted the need to evaluate and adapt internal structures and processes that are already in place to handle complaints to meet new requirements for shorter response times. Altogether, the increased frequency of interactions and number of ties created a situation in which users became more active in co-creation and explicit in conveying their needs.

## 5. Discussion

### 5.1 Advancement of services and value co-creation

The findings shed light on the fit between supply chain structures and the type of offering, highlighting the need for a multi-actor interface on the provider side, as exemplified in the

case of MedTech Inc., where not only the aftermarket group but also development engineers engage in direct customer interactions after purchase. Thus, direct user-developer contact was established, bypassing the aftermarket group and creating a need for new relationships between the development and aftermarket organisations. In the transition towards offering advanced services such as SSCs, new intra- and inter-organisational actor configurations shape the service supply chain (Eloranta and Turunen, 2015). While the development of the studied SSPs builds upon dedicated contact points at the provider side, the results of this study indicate that SSCs require a broader perspective as more actors at the provider end become involved. Thus, dyadic interactions – such as those between a customer and an aftermarket group – become more complex with service advancements (Bolton *et al.*, 2018; Kohtamäki *et al.*, 2021), involving multiple actors on the provider side. Consequently, specific dyads evolve into multi-actor relationships at the firm-user interface, resulting in increased intra-organisational participation at the interface. For example, for MedTech Inc., the firm-user interface expanded from involving clinics and the aftermarket function to also include the company's application developers and staff at sales offices. This highlights the changes required in supply chains, as digitalisation impacts the required capabilities (Li *et al.*, 2025) in service delivery as well as the range of services offered (Birch-Jensen *et al.*, 2020). With providers as multiple actors (i.e. several actors within the provider organisation are involved), the shift towards offering SSCs raises the number of ties with customers, as more actors within the provider organisation have direct contact with them. Within provider-customer ties, a shift in the direction of interaction also occurs, as the customer, previously a receiver of products and SSPs, becomes a driver of interaction when SSCs are offered. Thus, the focal point needs to be on the customer side and customer value creation (Grönroos and Voima, 2013; Altuntas Vural, 2017), acknowledging that value is created by the customer. Moreover, there is a need to nuance the customer as an actor as customers might also become a multi-actor interface if the purchasing customer of an SSC is not the same as the actual user.

The conceptual framework provides a way to graphically display the dynamics in supply chain configurations owing to services advancements. Such a visualisation allows for a more in-depth understanding of the ways to configure a supply chain that responds to changes in customer and user interactions, leading to processual changes in such configurations (Vargo *et al.*, 2023). The examined cases illustrate that both actor configurations and interactions change when SSCs are offered instead of SSPs. A key change is that both customers and users engage in more direct interactions with various actors on the provider side, aligning with what the literature suggests as user-centric offerings (e.g. SSCs). As an example, the education (SSC) offered by Materials Inc. created new, formalised provider – user interactions. In this context, customers not only passively receive value but also co-create it (Sampson and Spring, 2012; Petri and Jacob, 2016; Sousa and da Silveira, 2017; Altuntas Vural, 2017). These cases reveal that new relationships emerge between customers, users and providers, as well as within the provider organisation. This has led to the need for frequent reconfigurations of supply chains as

networks, rather than following the traditional linear chain logic (Spring and Araujo, 2013):

P1. The complexity of interactions with customers and users increases when services are advanced from P to SSPs and SSCs.

### 5.2 Intra- and inter-organisational relationships

Understanding the changes in supply chain configuration caused by service advancements sheds light on the role of interactions and underlying mechanisms in enabling the further development of services. For example, modified intra-organisational interactions act as mechanisms for understanding customers and users (e.g. Petri and Jacob, 2016). Thus, the service provider benefits not only from engaging with customers (i.e. users or receivers) but also from collaborating with other intra-organisational actors involved in the service supply chain. Moreover, as services differ in nature from products (e.g. being produced and consumed concurrently) and users expect rapid responses to feedback (Gremyr *et al.*, 2022), it is necessary to develop feedback processes that capture feedback directly connected to the use of the offering, as exemplified by MedTech Inc. that when launching an app (SSC) received feedback directly from users expecting fast responses. However, they also kept getting formalised feedback from clinics, thus feedback processes must be flexible enough to accommodate various types of feedback while remaining structured to ensure organisational learning based on processed feedback. Such developments are facilitated and catalysed by digitalisation (Gremyr *et al.*, 2022; Birch-Jensen *et al.*, 2020) and techniques available for direct interactions with users have provided compelling insights into service triads, especially regarding the configuration of service supply chains (Hsuan *et al.*, 2021).

This study shows that service advancements can lead to certain intra-organisational functions being bypassed – for example, the aftermarket function at MedTech Inc. A similar implication emerged in the case of Materials Inc., where SSCs, compared with both products and SSPs, involved two important changes in supply chain configuration. Firstly, from an intra-organisational perspective, a dedicated organisational unit was established to interact with customers (and users) regarding SSCs. Secondly, from an inter-organisational perspective, interactions with customers became more focused and directed towards the users. Furthermore, SSCs facilitated the involvement of other organisations in delivering the new service, as the training and education offered are not unique to the brand but rather to the type of equipment. Thus, this study highlights the importance of evaluating the feasibility of the current supply chain configuration for offering SSCs and ensuring that they are properly supported by the necessary expertise both intra- and inter-organisationally. Furthermore, SSCs accommodates many contacts with individual customers, which challenges the notion that customers or users need a single point of contact. Ultimately, when the supply chain configuration changes from unidirectional (P) to bidirectional (SSC), some relationships therein will diminish as others expand, owing to increased contact points (Sampson, 2000)

and thus value co-creation shifts from dyadic to multi-stakeholder interactions (Saxena *et al.*, 2024):

P2. SSCs require new intra- and inter-organisational relationships in the supply chain structure, including the accentuation of customers and users as co-creators.

### 5.3 Supply chain configuration and feedback

The results imply that moving to an SSC requires faster and more flexible feedback processes to accommodate diverse methods for handling customer feedback, which is consistent with Gremyr *et al.* (2022) findings. Without such processes that enable feedback from various actors on the customer side in diverse formats, there is a risk of hindering feedback-based learning and limiting improvements and new service development. Richer yet potentially more unstructured feedback arises as interactions between actors change when moving towards SSCs. In all three cases, service advancements were built upon a transition from the traditional linear dyadic supply chain of actors to a network format with multi-actor interfaces. In this arrangement, the user assumes a focal role (i.e. active and direct) in interacting with providers, whereas providers comprise multiple actors, allowing users access to various entry points within their organisations. In Digital Care, the SSC allowed the patients to directly communicate with multiple healthcare staff, strengthening the role of the patients and their connections to various actors at the provider side. Service advancement thus suggests that certain links are becoming stronger – for example, users bypassing intermediaries and directly contacting developers in the provider organisation. Such contacts are direct and potentially unlimited in time and space, resulting from digitalisation:

P3. Service advancements require faster and more flexible feedback mechanisms that capture diverse customer and user experiences to support continuous service improvements.

## 6. Conclusions

Taking a supply chain perspective on service advancements, this study focuses on an organisation's ability to offer advanced services, depending upon – and also shaping – the supply chain configuration through a constellation of intra- and inter-organisational actors and ties. Thus, it contributes to the literature on service advancements and service supply chain management by examining how service advancement shapes the configuration of supply chains and highlighting the criticality of the fit between the services offered and the supply chain.

To understand the implications of service advancement for service supply chain configuration, a conceptual framework was developed to analyse how actors and ties change during service advancements. Three case studies with different offerings – Materials Inc., MedTech Inc. and Digital Care – showcase the shaping of their supply chain structure due to service advancement, with a specific focus on changes in customer and user interactions. To operationalise the supply chain configuration, empirical data were organised by scope (i.e. direction and number of ties) and scale (i.e. frequency of

interaction and number of contact points). This study has three key theoretical implications. Firstly, with service advancements the complexity of interactions increases, requiring multi-actor interfaces on the provider side allowing for more direct interactions with customers and users. Secondly, the proposed conceptual framework illustrates how SSCs necessitate new intra- and inter-organisational relationships in the supply chain structure, including the accentuation of customers and users as co-creators. Thirdly, service advancements call for faster and more flexible feedback processes that capture diverse customer and user experiences to support service improvements and developments.

From a managerial perspective, this study shows that offering services such as SSCs requires a reconfiguration of supply chains. Firstly, managers responsible for business development as well as supply chain design must recognise that with service advancements, the number of ties between actors, number of contact points between users and service providers and the frequency of interactions with customers all increase. Secondly, with new actor ties and more complex interactions with users, development teams that often operate as back-office, must be closely integrated with front-line units that have on-going, multiple contacts with service users. Thirdly, business development units must be able to evaluate new and advanced service offerings early during the design stage, in relation to the supply chain structure needed to deliver them. Strategically, supply chain configuration – inclusive actor constellation, ties, interactions – should be regarded as an integrated part of service design, instead of a residual of it. Fourthly, since service advancements often require engagement of key suppliers in the service delivery, the purchasing organisation must also be active in front-end service design to provide input into deliverability and to analyse potential supply risk and dependencies of critical suppliers and resources. Finally, the study suggests that managers must build feedback processes to collect, analyse and exploit the rich but often unstructured feedback from customers and users as a resource for new service development and improvements.

### Limitations and future research

This study explored three qualitative cases at different positions in the supply chain. Future research could involve surveys with more actors in supply chains (locally, internationally or globally), hence extending the scope to an ecosystem level to test the three propositions, which could enhance generalisability. Another avenue for future research is to explore the influence from various drivers of service advancements – including competition, technological advancements and new customer requirements – on the resulting supply chain configuration. This study showed that SSC impacts not only the relationship between the provider and customer but also the users and ties among actors. It would be interesting to further investigate the impact of users as focal actors on interactions and ties between other actors in the supply chain – for example, studies on how feedback systems between such actors can lead to performance benefits in the supply chain (Hall *et al.*, 2022) and contribute to the development of inter-organisational theories in supply chain management (Halldórsson *et al.*, 2007). With users as focal actors, another avenue for future research is to investigate how service

advancements influence the quality of interactions and outcomes in supply chains. This commitment to users also calls for a behavioural approach to service development, in line with a stream of research in operations management on behavioural operations (e.g. Mura *et al.*, 2016). This analysis would provide insights into the roles and motivations of different actors over time. Future research could also extend the scope of SSCs and explore further advancements to services supporting users.

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## Further reading

- Hakanen, T. and Jaakkola, E. (2012), “Co-creating customer-focused solutions within business networks: a service perspective”, *Journal of Service Management*, Vol. 23 No. 4, pp. 593–611, doi: [10.1108/09564231211260431](https://doi.org/10.1108/09564231211260431).

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