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Supply chain services from a service-dominant perspective: a content analysis

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Abstract

Purpose – This paper aims to apply service-dominant logic thinking to the field of supply chain management (SCM) in order to classify, structure, and analyze different types of supply chain services (SCS) collected from interdisciplinary literature. The authors investigate how value is co-created between supply chain actors and develop research propositions regarding the influence of service type on value co-creation.

Design/methodology/approach – Content analysis is employed to research SCS across 218 articles from 28 journals of logistics and SCM, service, finance and accounting, and information systems research.

Findings – The occurrence of SCS within the literature is rising, and most SCS mentioned have a relieving as opposed to an enabling function. Also, SCS related to material and information flows dominate the field, whereas finances-flow-related services receive less attention. Finally, the paper provides evidence that different types of SCS require different management approaches.

Research limitations/implications – Analyzing the literature and integrating different streams of research are only a first step towards building new theory. To test the developed propositions, further empirical research is encouraged.

Practical implications – The paper offers implications for the management of different types of SCS from both the service provider's and service customer's perspective.

Originality/value – The paper provides an interdisciplinary overview of the value proposed by different types of SCS. Furthermore, six service-dominant logic-based research propositions regarding the impact of service type on value co-creation are developed.

Keywords Service-dominant logic, Supply chain management, Content analysis, Value co-creation, Supply chain services

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1. Introduction

Traditionally, organizations within supply chains have been viewed as entities that work independently to move materials from suppliers downstream to end-users in order to generate revenue (La Londe and Masters, 1994). Proponents of a new theory of

marketing, called service-dominant logic (S-D logic), however, argue that supply chains are value co-creation networks. In these networks, service is the fundamental basis of exchange (Vargo and Lusch, 2004). Hence, just as services render service, "goods are distribution mechanisms for service provision" (Vargo and Lusch, 2004, p. 8) because they enable firms to transfer their skills and knowledge to other actors (Tokman and Beitelspacher, 2011). Therefore, supply chains not only consist of suppliers and buyers of goods, but all the firms that integrate their skills and knowledge in "all the upstream and downstream flows of products, services, finances, and information from the ultimate supplier to the ultimate customer" (Mentzer *et al.*, 2001, p. 4) to co-create compelling service offerings for and with end-users. Many of these actors perform non-manufacturing activities such as logistics, supply chain financing, and information management (Mentzer *et al.*, 2001). Consequently, third-party service providers play an important role in the smooth flow of materials, finances, and information (Ross *et al.*, 2007). However, past supply chain management (SCM) research seldom included these actors when discussing the management of supply chain interfaces (Martinsen and Björklund, 2012). Instead, it concentrated on the interfaces between suppliers and buyers of goods (Stefansson, 2006), rendering supply chain service providers "the forgotten actors of supply chain integration" (Fabbe-Costes *et al.*, 2009, p. 72).

Our study aims to close two gaps in the existent literature. First, we apply S-D logic-based thinking to classify supply chain services (SCS). On the one hand, we classify SCS according to the value that they propose in facilitating the flow of materials, finances, and information. Thereby, we integrate and structure interdisciplinary research on different types of SCS. So far, many studies have focused on material-flow-related SCS such as logistics services (Creazza *et al.*, 2010), specific information-flow-related services such as track-and-trace solutions (Ellinger *et al.*, 2003), and financial-flow-related services such as inventory financing (Hofmann, 2009) in isolation. A comprehensive literature review covering the complete set of value propositions made by different types of SCS, reflecting customers' various service requirements, has not yet been conducted to the best of our knowledge. On the other hand, we classify SCS based on different value co-creation constellations between service providers and customers. Thereby, we answer Daugherty's (2011) call to apply the concept of value co-creation to supply chain relationships, a so far neglected but relevant area in SCM research. Previous service classifications focus on either the service customer or the provider. However, since "S-D logic argues that value can only be created with and determined by the use in the 'consumption' process" at the intersection between service provider and beneficiary (Lusch, 2007, p. 265), an S-D logic-based classification needs to consider both perspectives equally.

Second, we apply S-D logic thinking to the question of whether different types of SCS should be managed differently to achieve superior service performance. This approach is based on Lusch *et al.*'s call (2010) to further investigate how service providers and customers (should) co-create value and which value co-creating roles they (should) adopt. To extend previous theory, we develop several research propositions regarding the management of different types of SCS.

The remainder of this paper focuses on developing an analysis framework to classify SCS from key literature. The findings are then presented alongside of developing research propositions to guide future research.

2. S-D logic and supply chains

S-D logic, a recent marketing approach by Vargo and Lusch (2004, 2008), argues that service is the fundamental basis of exchange in all economies, not only service economies. Instead of differentiating between goods and services, S-D logic claims that customers do not buy a product or a service, but that "activities render services [and] things render services" (Gummesson, 1994, p. 78). Consequently, goods are transmitters of embedded knowledge and skills, just as service is. In other words, S-D logic understands service as a higher-order concept, according to which actors apply "specialized competences (knowledge and skills) through deeds, processes, and performances for the benefit of another entity" (Vargo and Lusch, 2004, p. 2) rather than trading tangible or intangible units of output. To explain service provision, S-D logic differentiates between two types of resources. Operand resources (e.g. raw materials) are tangible and static and only become of value if an action is performed upon them. Operant resources, such as knowledge and skills, are intangible and dynamic. They are used to act on operand resources (Lusch, 2007). To eventually co-create value, different actors need to apply and integrate different types of resources (Vargo and Lusch, 2011).

Traditionally, supply chains have been viewed as linear sets of organizations that move operand resources (e.g. goods) forward (Tokman and Beitelspacher, 2011). Depending on their level of complexity, Mentzer *et al.* (2001) name such supply chains either "direct", including the upstream and downstream flows of products, services, finances, and/or information between a focal company, its supplier, and its customer, or "extended", additionally including the supplier's supplier and the customer's customer. Beyond this linear understanding, "ultimate supply chains" comprise all the actors involved in "all the upstream and downstream flows of products, services, finances, and information from the ultimate supplier to the ultimate customer" (Mentzer *et al.*, 2001, p. 4), highlighting the idea that supply chains are better described as networks of organizations (Christopher, 2005). Figure 1 shows supply chains according to their level of complexity.

Based on these arguments, it is not surprising that many of the ideas of S-D logic fit naturally with SCM research because SCM is also concerned with applying and integrating resources that are required to make competitively compelling value propositions (Lusch *et al.*, 2010).

First, SCM advocates "a systems approach to viewing the supply chain as a whole" in which "each firm in the supply chain directly and indirectly affects the performance of all the other supply chain members" (Mentzer *et al.*, 2001, p. 7). This argument is well in line with S-D logic-based thinking that characterizes firms as value co-creators (Vargo and Lusch, 2008), even though S-D logic puts a stronger emphasis on the non-linear nature of value co-creation in the entire value network (Tokman and Beitelspacher, 2011). Second, SCM implies a strategic orientation toward firm collaboration to integrate intrafirm and interfirm capabilities into a coherent whole (Mentzer *et al.*, 2001). In other words, firms are resource integrators. Third, SCM is a customer-focused concept aimed at creating unique sources of customer value (Mentzer *et al.*, 2001). While S-D logic agrees with the proposed customer focus, it goes even further and sees the role of supply chains in "supporting the customers' value creating processes with service offerings, either directly or through goods" (Lusch *et al.*, 2010). Since customers are always co-creators, not just recipients of value, interactions between actors should be analyzed from a relational instead of a transactional perspective (Tokman and Beitelspacher, 2011).

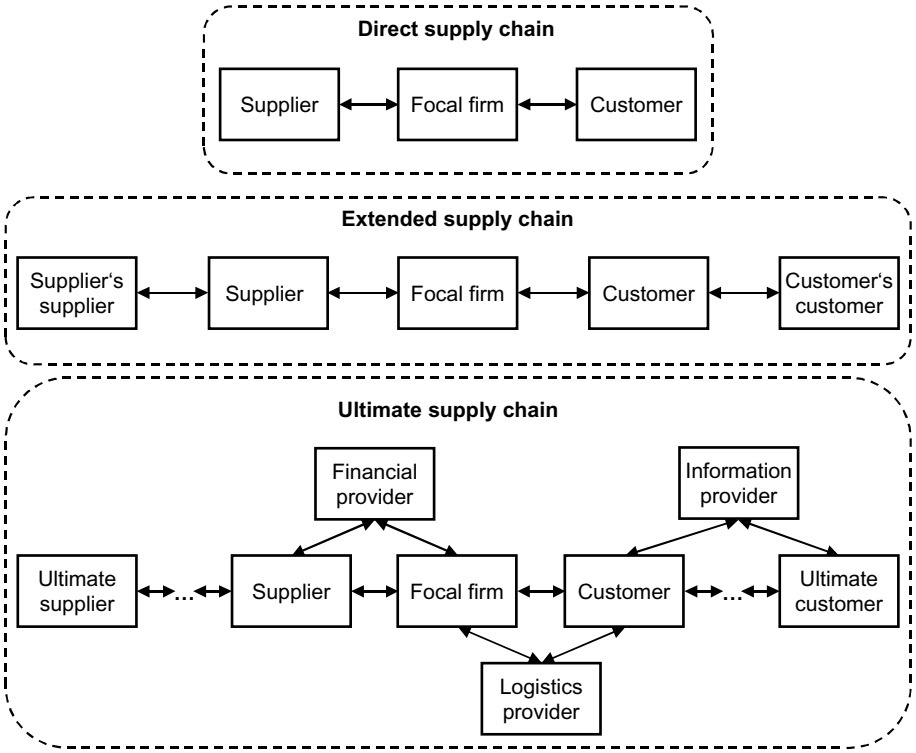

Figure 1.
Types of supply chains according to Mentzer *et al.* (2001)

3. S-D logic and SCS

The separation of information from physical matter and the rising amount of organizational specialization have led to an increasing amount of outsourcing (Lusch, 2011). Many of the outsourced activities are non-manufacturing-based, carried out by third-party service providers, and revolve around optimizing the flow of material, information, and finances as operand resources. As Lusch *et al.* (2010) note, outsourcing non-core activities enables supply chains to make more compelling and customized value propositions based on the integration of distinct service elements of multiple, specialized actors. For instance, specialized financing providers that offer the integrated management of firms' cash-to-cash cycles and inventory can improve the overall service experience for all of the involved actors (Hofmann, 2009).

In general, SCS providers aim to create reciprocal value through the application of their complementary operant resources. They want to co-create value with other supply chain actors by reconfiguring business processes regarding "the form of resources, the time they are available, the place they are available, and the possession or use of these resources" (Lusch *et al.*, 2010). The operand resources on which SCS providers perform their actions are materials, information, and finances that flow across supply chains (Mentzer *et al.*, 2001). According to Normann (2001), two fundamental ways of providing service exist. Service providers can either relieve other supply chain actors by performing a task or a series of tasks for these actors or enable

these actors by permitting them to perform a task or a series of tasks more efficiently and/or effectively. Based on these arguments, we define supply chain service as the application of operant resources through deeds, processes, and performances to co-create value with another supply chain actor or other supply chain actors by relieving or enabling the supply chain flows of materials, information, and/or finances.

4. Classifying SCS from a service-dominant perspective

Liu *et al.* (2008) conducted a comprehensive review of service classifications covering the literature of the past five decades. Building on Cook *et al.*'s (1999) review, they established a comprehensive classification scheme based on the four dimensions "provider" (people, equipment, and knowledge), "process" (customization, standardization, contingency), "place" (front office, back office, virtual), and "customer" (human, thing, information). The framework broadly covers different service aspects. However, like other previous frameworks, it does not explicitly state what the proposed service value actually is and how this value is co-created. Also, the framework is not geared to simultaneously include more than two actors and is grounded in goods-dominant as opposed to service-dominant thinking, since the customer is viewed as a receiver of value and not as a co-creator of value that is endogenous to service provision.

Moreover, many previous classification frameworks distinguish between business-to-consumer (B2C) and business-to-business (B2B) service provision (Boyt and Harvey, 1997; Wynstra *et al.*, 2006). However, as Vargo (2009, p. 377) points out, "the customer is just another node in the larger ecosystem and the actor-to-actor transaction serves as a platform for further value creation in that larger context." Accordingly, S-D logic argues that service is an actor-to-actor, not solely a B2B or a B2C concept (Vargo and Lusch, 2011). Consequently, to gain in-depth insights into SCS from an S-D logic perspective, we classify them according to what SCS providers can offer their customers, in other words value propositions, and based on how value is actually co-created between two or multiple supply chain actors. We do not distinguish between B2B and B2C relationships.

4.1 Classifying SCS by value proposition

SCS providers can only offer value propositions as opposed to delivering value to customers unilaterally (Vargo and Lusch, 2008). The value proposed by SCS reflects the specific needs that customers have, such as a just-in-time delivery of goods to a customer's manufacturing facility to lower inventory levels and space requirements (Fugate *et al.*, 2009). Consequently, value propositions involve the operant resources that a service provider plans to deploy in order to perform certain activities, and the operand resources, e.g. material, information, and finances, that these activities are performed upon (Constantin and Lusch, 1994). Additionally, value propositions can be classified by their "relieving" or "enabling" nature (Normann, 2001).

4.2 Classifying SCS by value co-creation and co-production

According to Lusch *et al.* (2007), even though customers are always endogenous to service provision, they take different roles in co-creating value with other supply chain actors. Therefore, Lusch *et al.* (2007) distinguish between active value co-production and general value co-creation. Value is co-produced when customers "participate in

the creation of the core offering itself" (Lusch, 2007, p. 265). This entails interactive processes such as shared invention, co-designing service offerings via direct and indirect feedback channels, and/or a shared production of goods (Lusch *et al.*, 2007). However, even if customers are not actively involved in creating the core offering itself, they co-create value during their "consumption" process either through direct interaction between the involved supply chain actors or by mediation through physical goods (Lusch, 2007). They incorporate the service into their specific usage scenario to generate value-in-use (Flint and Mentzer, 2006).

In order to understand value co-creation and co-production processes, the consideration of the roles of SCS providers and customers is highly important. Anderson *et al.* (2011) demonstrate that not all customers want to engage in co-productive relationships because they differ in their specific needs and desired involvement in service provision. Therefore, SCS providers need to adjust their offerings to different customer requirements. To balance provider-specific resource investments with customers' co-production intents, service providers can regulate the degree to which they standardize/customize their services. In highly standardized offerings, such as direct transportation services on freight exchanges, the customer has little influence on service process execution in exchange for a low-cost transportation service. In other instances, highly customized service bundles such as complex contract logistics solutions are requested in order to serve customer needs. Consequentially, no single optimal level of resource integration and service customization exists across all types of SCS. In fact, we believe that service type and the desired value-in-use determine how the specific relationship should be structured.

The SCS analysis framework in Figure 2 shows that SCS providers' deployment of operant resources allows them to make relieving or enabling value propositions regarding the flow of materials, information, and finances, as well as to co-create and potentially co-produce value with other supply chain actors. Furthermore, Figure 2 shows that the application of operant resources among multiple supply chain actors ultimately leads to the cooperative creation of service offerings for end-users. Hence, the SCS analysis framework abstracts from a pure provider or customer perspective and allows for the integration of multiple actors.

5. Methodology

To assess the occurrence of different SCS within the literature, we conducted a content analysis as it allows researchers to systematically, reliably, and objectively study previously published material (Li and Cavusgil, 1995). Furthermore, it enables researchers to analyze the content of a field quantitatively as well as qualitatively to outline key themes, to determine trends being reported, and to support theory-building approaches (Cullinane and Toy, 2000; Spens and Kovács, 2006).

5.1 Sampling

We selected an inter-disciplinary journal basis, restricting our search within each field to the top-ranked journals, which employ rigorous quality control (David and Han, 2004). To select journals, we followed the academic rankings of Bonner *et al.* (2006), Beattie and Goodacre (2006), Willcocks *et al.* (2008), Lowry *et al.* (2004), Chapman and Ellinger (2009), Charvet *et al.* (2008), Menachof *et al.* (2009) and Svensson *et al.* (2007).

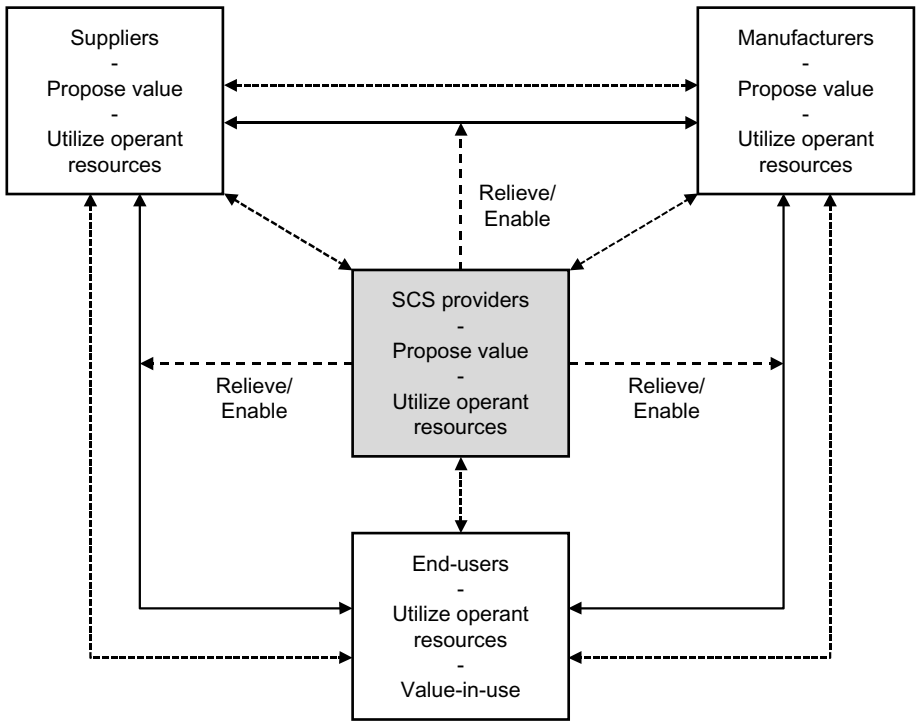

Figure 2.
Supply chain service analysis framework

Source: Based on Tokman and Beitelspacher (2011)

We selected 28 journals as listed in Table I to cover the academic disciplines relevant to the proposed definition of SCS, i.e. logistics and SCM, service, finance and accounting, as well as information systems.

We applied two different units of analysis. First, to measure the occurrence of different types of SCS and their value propositions over time, we chose themes mentioning SCS (e.g. "transportation management") as a first unit of analysis. Second, we defined the paragraphs containing an SCS theme as another unit of analysis to investigate SCS value co-creation. Through this approach, both explicit and latent content was recorded to gain in-depth insights into SCS value propositions and value co-creation. Reacting to methodological criticism that refers to the dependence of content analysis upon coder judgment (Guthrie *et al.*, 2004) we followed the approach taken by Spens and Kovács (2006) and applied measures to ensure objectivity, reliability, and validity of our research. The most important measures relate to determining clear coding rules, using two independent coders, conducting peer workshops to reach consensus whenever disagreements between coders arose, extending pre-established categories for coding throughout the coding process, and using S-D logic as a theoretical base for the coding scheme.

Journal	2000 and earlier	2001-2005	2006-2010	Total
Logistics and Supply Chain Management Research	31(5)	58(8)	93(11)	182(24)
International Journal of Physical Distribution and Logistics Management	8(2)	16(4)	24(2)	48(8)
Supply Chain Management Review	–	11(0)	21(0)	32(0)
Journal of Business Logistics	10(1)	2(0)	9(0)	21(1)
Supply Chain Management: An International Journal	4(1)	11(1)	14(3)	29(5)
Transportation Journal	3(0)	6(0)	3(0)	12(0)
International Journal of Logistics Management	2(–)	4(3)	6(4)	12(7)
International Journal of Logistics Research and Applications	2(1)	4(–)	6(1)	12(2)
Journal of Supply Chain Management	1(0)	2(0)	3(0)	6(0)
Supply Chain Forum: An International Journal	–	1(0)	7(1)	8(1)
International Journal of Purchasing and Materials Management	1(0)	–	–	1(0)
Transportation Research Part E: Logistics and Transportation Review	–	1(0)	–	1(0)
Operations and Production Management Research	1(1)	6(1)	13(3)	20(5)
International Journal of Operations and Production Management	1(1)	3(1)	8(2)	12(4)
European Journal of Operational Research	–	2(0)	1(0)	3(0)
International Journal of Production Research	–	1(0)	3(1)	4(1)
Journal of Operations Management	–	–	1(0)	1(0)
Service Research	3(0)	1(0)	3(0)	7(0)
International Journal of Service Industry Management	3(0)	–	2(0)	5(0)
Managing Service Quality	–	1(0)	1(0)	2(0)
Information Systems Research	–	–	6(2)	6(2)
Decision Sciences	–	–	2(0)	2(0)
European Journal of Information Systems	–	–	2(1)	2(1)
Journal of the Association for Information Systems	–	–	2(1)	2(1)
Management Research	–	–	2(0)	2(0)
Management Science	–	–	2(0)	2(0)
Financing and Accounting Research	–	–	1(0)	1(0)
Managerial Finance	–	–	1(0)	1(0)
Total	35(6)	65(9)	118(16)	218(31)

Note: Numbers in parentheses represent the number of articles that not only name SCS themes, but also include a description of SCS value co-creation

Table I.
Included articles per journal and over time

5.2 Coding scheme

To analyze the content of the articles, we pre-established a coding scheme based on the two dimensions of our SCS analysis framework, namely value proposition as well as value co-creation and potential co-production.

Value proposition. To reach a meaningful and operational classification of SCS value propositions with regard to the operant resources that SCS providers deploy during service provision, we differentiated between unbundled individual services and bundled service packages (Delfmann *et al.*, 2002). Whereas individual service offerings implicate the deployment of a lower amount of operant resources by SCS providers, bundled services are generally more complex and require higher investments in resource acquisition due to an increased service scope (Kowalkowski *et al.*, 2009).

For instance, a "reverse logistics" bundle can include individual services such as the collection and subsequent recycling, refurbishment, and/or disposal of goods (Stock and Mulki, 2009). Regarding operand resources, we distinguished between materials, information, finances, and an overarching category. While almost any transaction results in information exchanges, e.g. in terms of invoicing, our differentiation logic refers to the primarily impacted operand resource. The impact on an operand resource needs to be a major objective of the service in question rather than a mere by-product. The category "overarching" was therefore only used when multiple operand resources were deemed equally important for value co-creation. Finally, we distinguished between relieving and enabling SCS.

Co-creation and potential co-production of value. How value is co-created and potentially co-produced between the involved actors was assessed according to SCS providers' customization and service customers' value co-creation and potential co-production efforts. Regarding the degree to which a given SCS is customized, we assessed, taking a provider's perspective, whether the service processes were predominantly standardized or customized to customers' specific needs. Furthermore, we evaluated whether service customers actively co-produced the described core service offering in terms of shared inventiveness and/or the co-design of service operations. Whenever customers actively co-produced the service as opposed to representing the mere beneficiary of service provision by creating value-in-use, an SCS was classified as co-produced.

6. Findings from the content analysis

6.1 Descriptive section

We used a keyword search strategy to identify the most relevant articles. The deployed keywords stemmed from an initial scanning of the recent literature, from peer discussions, and from our subsequent review of the literature. Our final list encompassed the following keyword pairs: "supply chain"-"service*", "supply chain"-"outsourc*", "supply chain"-"financ*", "supply chain"-"third-part*", and "supply chain"-"intermed*". The keyword search was carried out using ABI Inform Global, Business Source Complete, and ACM Digital Library.

In a second step, we reviewed the abstracts of the identified 1,279 articles and excluded 930 articles because they were not related to the notion of SCS as previously defined. Subsequently, the remaining 349 articles were read in full, leading to the exclusion of another 131 articles that did not contain SCS themes. In consequence, a final sample of 218 articles was derived. Furthermore, with regard to our second unit of analysis, 31 articles were found to contain in-depth descriptions of SCS. Table I shows the temporal distribution of the 218 articles across different research disciplines and journals. A list of the articles included in our analysis can be obtained from the authors.

Value proposition. We identified 1,386 occurrences of SCS offerings across the 218 articles analyzed in full. The number of SCS in a given article ranged from 1 to 57, while the average number per article was 6.5. The analysis highlights that the number of SCS addressed within the literature has been on a steady rise, indicating an increasing importance of service provision in supply chains (see Tables AI and AII in the Appendix for the temporal distribution of SCS offerings). Furthermore, when comparing the occurrence of relieving to that of enabling SCS, we found relieving SCS to play the dominant role, constituting 87.6 percent of all SCS mentions.

To handle the amount of identified SCS offerings, we introduced a substructure to further organize them. First, we reconciled different terms used for similar activities across the literature, e.g. "motor transport" and "ocean transport" being assigned to "direct transportation service." Then, we derived higher-level service categories related to the nature of the underlying activities. For instance, "direct transportation service" and "fleet management and operations" were grouped into the category of "transportation/transportation management." Subsequently, we assigned these higher-level categories of SCS either to the class of unbundled or bundled services as listed in Tables AI and AII in the Appendix.

Table II illustrates the distribution of SCS according to the dimensions of "unbundled/bundled SCS" as well as "relieving/enabling SCS" and the operand resources that the services impact. The first row in each cell indicates the total number of SCS occurrences, while the second row shows the number of SCS occurrences on a per paper basis, with each paper counting a maximum of one SCS per cell.

According to our content analysis, the most frequently mentioned SCS offerings were "unbundled, information-focused", "unbundled, material-focused", and "bundled, flow-overarching" SCS. When analyzed more closely, flow-overarching SCS also had a strong inclination towards information and material flows. Therefore, the traditional focus of supply chain research on logistics and information exchange seems to be heavily reflected in the high number of SCS that relate to information and material flows. Within the most popular matrix cells, "transportation/transportation management," "warehousing/warehouse management" as well as "integrated logistics solutions" represent the most commonly cited SCS offerings. Product testing, quality control, terminal operation, data analysis, reverse logistics, security services, and software-as-a-service only received minor coverage. However, especially the last three SCS types seem underrepresented in the literature given current global trends regarding environmental concerns and business ethics, security issues, and new technologies (Hameri and Hintsa, 2009).

Since SCS offerings that impact several supply chain flows at once are typically more complex, it is not surprising that no unbundled, overarching SCS, except for enabling consulting services, were discovered in our analysis. Also, given that more complex, bundled solutions typically require more extensive coordination and planning that add a significant informational component (Delfmann *et al.*, 2002), we find it plausible that we did not detect service bundles which solely impact material flows. In contrast, however, we did find service bundles that particularly focused on information flows, representing 7.0-10.2 percent of all SCS in our sample. Due to the rising importance of so-called infomediaries, representing firms that "uniquely and

Category	Finances	Information	Material	Overarching	Total
Unbundled SCS	5.8% (80)	23.0% (319)	37.3% (517)	0.9% (13)	67.0% (929)
	8.5% (44)	23.3% (121)	29.2% (152)	0.6% (3)	61.5% (320)
Bundled SCS	0.0% (0)	7.0% (96)	0.0% (0)	26.0% (361)	33.0% (457)
	0.0% (0)	10.2% (53)	0.0% (0)	28.3% (147)	38.5% (200)
Total	5.8% (80)	29.9% (415)	37.3% (517)	27.0% (374)	100% (1,386)
	8.5% (44)	33.5% (174)	29.2% (152)	28.8% (150)	100% (520)

Table II.
Value propositions made by different SCS

specifically integrate, process, distribute, and sell information" (Lusch *et al.*, 2010, p. 26), we expect this trend to continue.

Regarding the remaining two matrix cells, unbundled SCS addressing financial flows represented a mere 5.8-8.5 percent of all SCS mentioned, while bundled financial solutions were nonexistent. Accordingly, our results support the fact that research on financial flows in supply chains is not at the traditional core of SCM research, especially since the discovered overarching SCS also heavily focused on information and material flows. This result is in line with other authors' findings (Pfohl and Gomm, 2009), even though prior studies show that financial solutions such as inventory financing can be beneficial to both the providers and customers of such offerings (Hofmann, 2009).

Co-creation of value. The coding along our second unit of analysis was limited to 56 SCS occurrences, confirming our expectation that only a subset of SCS would be supplemented by contextual information. Table III lists these SCS according to the degree to which service providers customized and service customers co-created or co-produced the service. Three out of four cells are represented in the sample, while customized and co-produced SCS represent the most common constellation. Furthermore, we discovered that none of the SCS constellations that were described in detail go beyond the dyadic level. Even though some SCS descriptions mentioned that more than two actors were involved in service provision, they did not describe more than one value co-creation interface in detail; the one between service provider and customer. Accordingly, our empirical insights are limited to the dyadic level as well.

Table IV illustrates five different types of SCS with different value co-creation implications that we identified, called strategic, leverage, commodity, customer-unbalanced, and provider-unbalanced SCS. Strategic SCS exhibit a high degree of customization and co-production. In this SCS category, we found offerings such as freight forwarding, 3PL and 4PL bundles, the management of customer spare parts, and product customization. Considering their value propositions, all described strategic SCS were bundled solutions, requiring the integration of a larger amount of operant resources by the involved actors.

However, not all customized and co-produced SCS can be termed strategic. Some consulting and training as well as market research services were also described as

Table III.
Supply chain service classification according to value co-creation/co-production and service standardization/ customization

	Value co-created	Value co-produced	Total
SCS provision standardized	13	0	13
SCS provision customized	5	38	43
Total	18	38	56

Table IV.
Five types of SCS in terms of value co-creation/co-production and service standardization/ customization

	Value co-created	Value co-produced
SCS provision standardized	Commodity	Customer-unbalanced
SCS provision customized	Provider-unbalanced	Strategic
		Leverage

customized and co-designed. We labeled these services leverage SCS because they represent enabling instead of relieving SCS. Accordingly, they are only indirectly linked to operational processes and provide value only indirectly, for instance by providing service customers with superior knowledge about end-users.

Provider-unbalanced SCS constellations display high degrees of provider customization and low degrees of customer co-production. In one instance, Gentry (1996) described a customized just-in-time transportation service that suffered from operational problems because the service provider was not involved in designing the SCS. Furthermore, the contract was given on a low-bid basis, indicating that no strategic alignment was undertaken between service provider and customer. On the other hand, customer-unbalanced SCS constellations show high levels of customer co-production and low levels of provider customization. However, we did not find any examples of these service constellations in our sample. We attribute this finding to the argument that it is usually the service providers that remain "in a 'henchman's' position towards their customers" in terms of relationship investments (Wolf and Seuring, 2010). Nonetheless, in theory, service customers could heavily invest in shared inventiveness and the co-design of SCS offerings without reciprocal efforts by the service provider, bearing the risk of transferring knowledge to the service provider without receiving an improved service performance in return.

Commodity SCS are characterized by low levels of service customization and low levels of co-productive efforts. Examples described in the literature mostly referred to "traditional" logistics services such as storage, warehousing, direct transportation, customs brokerage and clearance, and merge-in-transit. Commodity SCS represent standardized services that are often sourced from several providers, e.g. on freight exchange platforms, and do not require deeper process integration. In terms of their value propositions, commodity SCS showed the highest percentage of unbundled, individual services in the sample and they were usually described by transaction-based and not relationship-based purchasing concepts.

6.2 Theory-building section

Based on S-D logic and the findings from our descriptive section, we developed a research model that extends previous S-D logic approaches by introducing the type of service as a variable. Figure 3 shows this model. For ease of comprehensibility, the research model and propositions only include one service provider and one service customer. However, additional actors involved in service provision could be added analogously.

Our content analysis shows that resource integration and value co-production efforts vary across different types of SCS. For instance, from an SCS provider's perspective, strategic SCS are complex service bundles that require the integration of many different operant resources in order to perform the service. From an SCS customer's perspective, strategic SCS require co-design and shared inventiveness in order to help adapt the service to its specific needs. Contrarily, commodity services such as direct transportation are usually standardized and do not require heavy customer involvement. The service examples within the literature thus support Anderson *et al.*'s (2011) argument that not all firms want to (nor should) form co-productive relationships because of the required relation-specific resource investments that might not pay off for commodity services. As a consequence, not

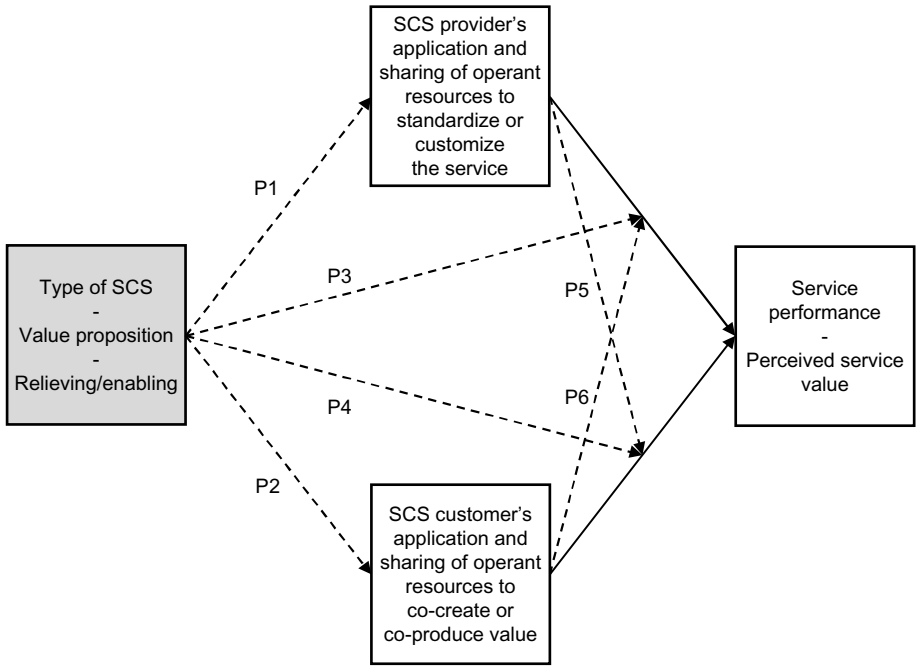

Figure 3.
Research model

all SCS should be highly customized and performed based on co-productive relationships. We thus propose that:

P1. SCS type influences the degree to which service providers customize their services.

P2. SCS type influences the degree to which service customers co-produce service value.

According to S-D logic, benefits of firm collaboration are joint learning and the exchange of substantial knowledge (Lusch *et al.*, 2010) based on "institutionalized processes that are purposefully designed to facilitate knowledge exchanges" (Dyer and Singh, 1998, p. 665). Supply chain partners' knowledge can be an important source for new ideas as well as process and product/service innovation (Cohen and Levinthal, 1990). Furthermore, superior knowledge-sharing routines based on direct and indirect feedback channels between the involved actors initiate and guide the co-design of services for improved effectiveness and efficiency (Flint and Mentzer, 2006). To facilitate the exchange of knowledge that will spark joint learning, the decision processes, operating systems, and organizational cultures need to be well aligned (Dyer and Singh, 1998; Flint and Mentzer, 2006). Within strategic SCS constellations, the involved supply chain actors are expected to work closely together along customized and integrated processes, offering many opportunities for knowledge sharing and joint learning. Also, SCS providers that provide highly customized SCS tailored to their customers' specific needs usually have to invest in relation-specific assets (Day, 2006). As a consequence, their customers will be less likely to find another SCS provider with

whom they can co-produce more value. In these instances, switching costs rise (Day, 2006) and inter-organizational asset connectedness increases, creating barriers for imitation (Brodie *et al.*, 2006).

In contrast, Anderson *et al.* (2011) argue that not all firms seek co-productive relationships. Especially in commodity SCS constellations, service customers usually have uncomplicated service requirements that many service providers can fulfill. They are characterized by low degrees of relation-specific resource investments and low levels of knowledge exchange. Price is usually a prime sourcing criterion for these SCS (Anderson *et al.*, 2011). Since knowledge-sharing routines and investments in relation-specific assets are costly endeavors that only prove worthwhile when service providers and customers collaborate long term to improve service performance, they should not be applied to every type of SCS. Based on these arguments we propose that:

P3. SCS type moderates the impact of the degree of service customization by service providers on service performance.

P4. SCS type moderates the impact of the degree of value co-production by service customers on service performance.

The need to co-create or even co-produce service value (Vargo and Lusch, 2008) implies that supply chain actors depend on each other with regard to the final value created and the level of service performance reached. Hence, a single firm's influence on service performance is at least partially limited to the other involved actors' willingness to share and integrate resources. In Gentry's (1996) description of a customized just-in-time transportation service, service performance was hampered by a lack of both provider involvement in the service's design and strategic alignment between provider and customer. As a result, the service provider's opportunities to improve the service depend upon the customer's willingness to invest in co-productive actions. Analogously, a service customer cannot independently improve service performance by sharing intensive knowledge with its service providers if they refuse to use it to improve their service operations. Therefore, unbalanced investments in relation-specific resources by one SCS partner that are not reciprocated by commitments from the remaining SCS partners will result in costs that cannot be easily regained (Lavie, 2006). Hence, we propose that:

P5. The degree of value co-production by service customers moderates the impact of the degree of service customization by service providers on service performance.

P6. The degree of service customization by service providers moderates the impact of the degree of value co-production by service customers on service performance.

7. Conclusions and further research

Prior service classification frameworks have adopted either a service buyer or provider focus. However, according to arguments from S-D logic, both perspectives need to be integrated to fully capture the relational aspects inherent in service provision. To fill this research gap, we developed an S-D logic-based analysis framework and applied it to SCS provision. The analysis framework differentiates between the value propositions made by different SCS and how value is actually co-created or

co-produced between the involved supply chain actors. Furthermore, we answer the call for an integration of service research, especially S-D logic research, into the SCM discipline (Tokman and Beitelspacher, 2011). Finally, to extend previous S-D logic theory, we derive six research propositions.

Our content analysis highlights that SCS are gaining traction as demonstrated by the increasing number of SCS mentions across journals. However, in terms of value propositions, past SCS coverage has focused mainly on SCS that impact material and information flows within supply chains. Corresponding to concerns by Pfohl and Gomm (2009), our results provide evidence that SCS related to the financial flows have not been discussed as extensively. Therefore, further research on finances-related SCS and on their value-enhancing role in flow-overarching SCS bundles is needed.

Moreover, our research extends the theory base of S-D logic by offering insights into how different SCS constellations have different management implications for firms. First, we highlight that the levels of customization and value co-creation/co-production vary across different SCS. Second, we provide further evidence that no single optimal level of firm collaboration and value co-creation exists (Das *et al.*, 2006). To improve service performance, service providers and customers are required to interact in varying ways across different types of SCS. Third, our framework highlights that service providers and customers are co-dependent in their attempts to improve the overall service performance and that service customers are required to assume their role as active value co-creators and/or co-producers. Overall, we believe that managers can profit from introducing different service categories to spark internal learning processes concerning how to manage the relationships with their supply chain partners in different SCS constellations in order to improve service performance (Wynstra *et al.*, 2006).

For future research, we encourage the testing of the developed research propositions. We believe that multiple case study approaches and multi-group survey research including matching pairs are suitable to gain in-depth insights into the deployment and integration of operant resources by multiple actors to co-create and co-produce value. Further research approaches should take different SCS constellations into account to evaluate how much service customization and value co-production are required for optimal service performance. Finally, our study illustrates that service provision has mainly been studied and operationalized at the dyadic level. Therefore, the field of SCM would profit from research that explicitly studies SCS provision and value co-creation beyond the dyadic level. Such studies might also consider the derivation of new research constructs that help to understand and evaluate value co-creation and co-production at the triadic and network level because triadic and network constellations go beyond the sum of the dyadic relationships between the involved actors due to indirect linkages (Barratt and Barratt, 2011).

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Appendix

Category	Service offering	2000 and earlier	2001-2005	2006-2010	Total	Affected OR[a]	Relieving/enabling
Administrative	Customer claims/customer inquiries handling	2	1	6	9	Information	Relieving
	Customs brokerage/customs clearance	3	9	15	27	Information	Relieving
	Documentation handling	1	3	4	8	Information	Relieving
	Invoicing/payment support process	11	11	26	48	Finances	Relieving
	Category total	17	24	51	92		
Consulting and training	Consulting service	6	22	27	55	Depends	Enabling
	Training service	1	1	6	8	Depends	Enabling
	Category total	7	23	33	63		
Data analysis	Data analysis/performance measurement	0	4	12	16	Information	Enabling
	Market research	1	3	6	10	Information	Enabling
	Category total	1	7	18	26		
E-commerce and software	E-portal/marketplace	1	11	14	26	Information	Enabling
	Software-as-a-service	1	0	7	8	Information	Enabling
	Category total	2	11	21	34		
Financing and insurance	Asset leasing	0	1	2	3	Finances	Relieving
	Insurance service	1	3	2	6	Finances	Relieving
	Inventory financing	2	1	4	7	Finances	Relieving
	Trade financing	0	6	8	14	Finances	Relieving
	Other financing	0	0	2	2	Finances	Relieving
	Category total	3	11	18	32		
Product configuration/customization	Assembly/installation	14	4	18	36	Material	Relieving
	Product customization	8	2	4	14	Material	Relieving
	(Re)packaging	13	17	18	48	Material	Relieving
	Category total	35	23	40	98		
Product information	(Re)labeling	5	10	14	29	Information	Relieving
	Tracking and tracing	5	15	25	45	Information	Enabling
	Category total	10	25	39	74		

(continued)

Table AI.
Unbundled supply chain service offerings

Table AI.

Category	Service offering	2000 and earlier	2001-2005	2006-2010	Total	Affected OR[a]	Relieving/enabling
Product/service purchasing	Carrier/supplier selection	8	11	15	34	Information	Relieving
	Purchase of materials	1	8	6	15	Information	
	Category total	9	19	21	49		
Quality management	Certification and credibility service	0	1	6	7	Information	Enabling
	Product testing/quality control	5	6	6	17	Material	Relieving
	Category total	5	7	12	24		
Reverse logistics	Collecting/sorting/testing of products	1	1	2	4	Material	Relieving
	Product returns	6	4	12	22	Material	Relieving
	Recycling/reconditioning of products	3	2	5	10	Material	Relieving
	Waste disposal	0	0	3	3	Material	Relieving
	Other reverse logistics service	0	2	3	5	Material	Relieving
	Category total	10	9	25	44		
Security	Security service	0	0	4	4	Material	Relieving
Terminal and consolidation	Merge in transit	4	7	15	26	Material	Relieving
	Shipment/freight consolidation	7	14	19	40	Material	Relieving
	Terminal service	2	1	8	11	Material	Relieving
	Category total	13	22	42	77		
Transportation/transportation management	Direct transportation service	37	52	98	187	Material	Relieving
	Fleet management/operations	8	3	9	20	Material	Relieving
	Routeing/scheduling/network design	3	8	13	24	Information	Relieving
	Category total	48	63	120	231		
Warehousing/warehouse management	Inventory management	12	11	25	48	Information	Relieving
	Order processing	9	8	16	33	Material	Relieving
	Storage	6	9	13	28	Material	Relieving
	Category total	27	28	54	109		
Total		187	272	498	957		

Note: [a]OR – operand resource

Table AII. Bundled supply chain service offerings

Category	Service offering	2000 and earlier	2001-2005	2006-2010	Total	Affected OR[a]	Relieving/ enabling
Export promotion and lobbying	Export promotion and lobbying	0	1	0	1	Overarching	Enabling
Information management	Operation of auto-ID system	0	0	3	3	Information	Relieving
	Operation of information exchange system	3	7	14	24	Information	Relieving
	Operation of warehouse/ transportation management system	8	5	18	31	Information	Relieving
	Operation of other information management system	0	0	4	4	Information	Relieving
	Category total	11	12	39	62		
Integrated logistics and value-added services	3PL bundle	15	18	27	60	Overarching	Relieving
	4PL bundle	3	6	17	26	Overarching	Relieving
	Collaborative planning, forecasting and replenishment	10	5	19	34	Information	Relieving
	Customer spare parts	4	4	4	12	Overarching	Relieving
	Freight forwarding	16	31	36	83	Overarching	Relieving
	Import/export management	2	2	1	5	Overarching	Relieving
	Order fulfillment	6	13	20	39	Overarching	Relieving
	Not specified bundle	3	2	12	17	Overarching	Relieving
	Category total	59	81	136	276		
Reverse logistics	Management of reverse logistics	1	7	9	17	Overarching	Relieving
Warehousing/warehouse management	Warehousing/warehouse management	25	28	48	101	Overarching	Relieving
Total		96	129	232	457		

Note: [a]OR – operand resource