

# Facilitators and inhibitors of value co-creation in the industrial services environment

Management  
of value  
co-creation in  
services

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609

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## Abstract

**Purpose** – The purpose of this study is to recognize the facilitators and inhibitors of value co-creation in the industrial service environment.

**Design/methodology/approach** – First, a systematic literature review (SLR) based on the systematic search flow (SSF) method was conducted, using six databases. Then, the content analysis proposed by Bardin (2011) was used to analyze the selected papers from SLR.

**Findings** – The authors identified a total of 11 facilitators and four inhibitors of value co-creation in industrial services. The findings show that concerning facilitators, the involvement of actors and synergy among participants reported a higher presence. As for the inhibitors, incompatibility among actors and actors' inexperience in the context of value co-creation were the ones that registered the most frequency.

**Research limitations/implications** – Even though the SLR covered a large proportion of the studies available, this research may not have enabled a complete coverage of all existing peer-reviewed papers in the field of value co-creation in industrial services.

**Practical implications** – This study assists managers in enhancing the performance of the value co-creation process. This is because, by knowing both the facilitators and inhibitors, managers can have an improved understanding of this process, thereby pondering these elements on the elaboration of their strategies and decision-making.

**Originality/value** – This study is one of the first attempts to recognize both the facilitators and inhibitors of value co-creation in industrial services.

**Keywords** Value co-creation, Industrial service, Facilitators, Inhibitors, Business-to-Business

**Paper type** Literature review

## 1. Introduction

Industrial services are a relevant source of profit and a competitive edge for their providers (Brax, 2005; Kowalkowski *et al.*, 2011; Gitzel *et al.*, 2016). In developed economies, they are responsible for more than half of the manufacturing industry's profits, thereby becoming an attractive market to operate in (Strähle *et al.*, 2012; Schmitz *et al.*, 2015; Gitzel *et al.*, 2016).

The customers of industrial services are other organizations rather than an individual (Homburg and Garbe, 1999), and, thus, this type of service create value for a customer in business-to-business (B2B) relationships (Priya Datta and Roy, 2011). In these relations, the collaborative development of service offerings is becoming a common practice (Kohtamäki and Rajala, 2016). This is due to the change in the dynamic of the dyadic customers–supplier's relationships (Ramaswamy, 2011; Oertzen *et al.*, 2018). They are no more on opposite sides; on the contrary, customers have taken a more active role in this relation, thereby creating value together with their service providers in the so-called value co-creation process (Galvagno and Dalli, 2014; Wang *et al.*, 2019).

Value co-creation in the industrial service environment pertains to the collaboration of suppliers and customers (Chowdhury *et al.*, 2016; Santos-Vijande *et al.*, 2016; Franklin and Marshall, 2019) that generate mutual benefits such as the improvement of offerings (e.g. products and services) and the creation of resolutions for solving the client's problems



(Skjølsvik, 2016; Chim-Miki and Batista-Canino, 2017; Dong and Sivakumar, 2017; Ribes Giner *et al.*, 2017). In spite of these benefits, value co-creation in industrial services faces some hurdles (Jaakkola and Aarikka-Stenroos, 2019), such as lack of perception of the value co-creation benefits (Jaakkola and Aarikka-Stenroos, 2019), long lead time for value generation, lack of perception of the economic gains (Virtanen *et al.*, 2015), inefficient information flow (Singh Panesar and Markeset, 2008; Rexfelt *et al.*, 2011; Nätti *et al.*, 2014), and unnecessary activities that slow down the value co-creation process (Breidbach and Maglio, 2016; Steinbach *et al.*, 2018; West *et al.*, 2018).

However, despite the economic importance of industrial services, they are still an under-researched topic (Homburg and Garbe, 1999; Paloheimo *et al.*, 2004; Panesar *et al.*, 2008; Schmitz *et al.*, 2015; Gitzel *et al.*, 2016). One reason for this is that the interface with customers has been extensively researched in Business-to-Customer (B2C), but much less in the B2B context, which is the case of industrial services (Karandikar and Vollmar, 2006). Also, because of this, the research on value co-creation in industrial services is still in its beginner (Roser *et al.*, 2013; Schwetschke and Durugbo, 2018). This lack of studies concerns authors such as Enz and Lambert (2012), who have emphasized the need for further research on value co-creation in the B2B context. Chowdhury *et al.* (2016) have expressed another worry related to this subject. According to them, existing research on value co-creation in B2B tends to focus only on the benefits thereof, thereby putting aside its negative aspects, for example, the barriers for co-creating value. This tendency comprises a thorough understanding of the value co-creation process and thus jeopardizes its management (Heidenreich *et al.*, 2015).

Based on the above considerations, the purpose of this study is to recognize the facilitators and inhibitors of value co-creation in the industrial service environment. Whilst details of each inhibitor directly point out the obstacles to value co-creation, the recognition of facilitators opens up the opportunity to discuss whether even them could have a negative impact on the collaborative relationship of suppliers and customers. Hence, this paper fulfills the aforementioned gap in the literature regarding studies related to the industrial services that impede the successfully management thereof (Schmitz *et al.*, 2015).

In the light of the foregoing, this study was guided by the following research questions:

*RQ1.* What are the facilitators and inhibitors to value co-creation in industrial service environment?

*RQ2.* Could the facilitators jeopardize value co-creation in industrial services?

To answer the research questions, we performed two stages. First, we conducted the Systematic Literature Review (SLR) that systematizes the search process. The motivation for this method is that it assists in mapping the portfolio of articles, ensures repeatability, avoids the researcher's bias, and assesses the relevance of the procedures employed in the elaboration of scientific production (Ferenhof and Fernandes, 2016). Also, since we seek to synthesize research on facilitators and inhibitors of value co-creation in industrial services, the SLR is useful for our study, because it enables an integrated overview of the state-of-art of a research field (Palmatier *et al.*, 2018).

In the second stage, we carried out the content analysis proposed by Bardin (2011) to analyze the resulting portfolio from the SLR. We argue that are three main reasons for undertaking this analysis. First, content analysis is regarded as a systematic and rigorous approach to analyze documents generated in the course of research (White and Marsh, 2006). Second, content analysis enables a condensed and broad description of a subject, as the outcome thereof is the summarization of data into categories (Elo and Kyngäs, 2008). Third, this research technique permits replicable and valid inferences from data to their context (Krippendorff, 2018).

Once both research questions are answered, managers will be able to rely not only on the value co-creation benefits in industrial services but also will have the possibility to ponder

facilitators and inhibitors in the elaboration of their strategies and decision making. Because the understanding of the nature of value co-creation in the B2B context, which includes identifying both positive and negative elements that influence this process, is pivotal for enhanced management of the dyadic relationship of suppliers and customers (Schwetschke and Durugbo, 2018).

The paper proceeds as follows. Section 2 presents an overview of the industrial services and value co-creation in industrial services. Section 3 describes the research method. Next, our findings are presented and discussed. Finally, the paper concludes with a discussion of the contributions of our study, limitations of the research, and proposes for future research.

## 2. Theoretical background

### 2.1 Industrial services

Industrial services have enormous importance for the economy, as they constitute a relevant source of profit and a competitive edge for their providers (Brax, 2005; Kowalkowski *et al.*, 2011; Gitzel *et al.*, 2016). Industrial services promote several advantages, for instance, they facilitate the sale of goods, lengthen the relationships with customers, and create opportunities for growth in the services market (Brax, 2005). In developed economies, they are responsible for more than half of the manufacturing industry's profits, thereby becoming an attractive area to operate in (Strähle *et al.*, 2012; Schmitz *et al.*, 2015; Gitzel *et al.*, 2016).

These services encompass a range of activities that add value for the customer in B2B (Business to Business) relationships (Priya Datta and Roy, 2011), thereby directly supporting customers' value creation and positively influencing their production processes (Gitzel *et al.*, 2016). In this sense, besides considering industrial services related to maintenance, repair and overhaul, Gitzel *et al.* (2016) also highlight that industrial services cover other activities such as training, engineering, predictive maintenance, advanced process diagnostics and fleet management. That is to say, industrial services include a wide range of supplier offerings that go from basic aftermarket services to complex solutions that combine goods and services (Kowalkowski *et al.*, 2011) that create value for the customer in B2B relationships (Kowalkowski, 2006; Priya Datta and Roy, 2011).

For including a variety of activities, industrial services have been studied under various perspectives and distinct academic disciplines (Schmitz *et al.*, 2015; Gitzel *et al.*, 2016). This has led to different definitions of this term in the literature (Homburg and Garbe, 1999; Kohtamäki *et al.*, 2015; Schmitz *et al.*, 2015; Gitzel *et al.*, 2016). Jackson and Cooper (1988), for instance, define industrial services as offerings delivered to industrial clients. Homburg and Garbe (1999) consider industrial services as services offered by a manufacturing firm to organizational customers. These both definitions have in common the fact that the customer is another company rather than an individual (Homburg and Garbe, 1999). In this sense, Paloheimo *et al.* (2004) point out that term "industrial services" have been used in three ways in the literature: (1) to indicate services offered for the industrial production process of the customers; (2) to define any B2B services, and (3) to refer to all services provided by the service industry.

In this study, we refer to industrial services as the second way (i.e. every B2B services) and we adopt the following definition of Bonamigo *et al.* (2021): "Industrial services comprise the offering of benefits between companies in a way that adds value to the business process."

### 2.2 Value co-creation in industrial services

In the B2B context, in which industrial services are delivered (Karandikar and Vollmar, 2006), the joint development of services offerings is becoming an increasingly common practice (Kohtamäki and Rajala, 2016). This is due to the change in the dynamic of the customers-suppliers dyadic relationships (Ramaswamy, 2011; Oertzen *et al.*, 2018). They are

no more on opposite sides; on the contrary, customers have taken a more active role in this relation, thereby creating value together with their service providers in the so-called value co-creation process (Galvagno and Dalli, 2014; Wang *et al.*, 2019).

According to the S-DL (Service-Dominant Logic), the value co-creation process consists of two different components: co-production and co-creation (Lusch and Vargo, 2006). The former pertains to the activities jointly performed by the supplier and its customer for the creation of an offering (e.g. service, product), whereas the latter is aligned with *value-in-use* (Lusch and Vargo, 2006; Vargo, 2008). *Value-in-use*, in turn, is associated with the customer's experience, thereby emerging through the usage, when the customer applying its competences and skills integrates the offering to its process (Hakanen and Jaakkola, 2012; Kohtamäki and Rajala, 2016). This experience can also be jointly created with the supplier through interactions (Aarikka-Stenroos and Jaakkola, 2012; Kohtamäki and Rajala, 2016), whereby suppliers, for example, through dialogue facilitate the implementation of the offering in the customer's process (i.e. suppliers support the creation of *value-in-use*) (Aarikka-Stenroos and Jaakkola, 2012). Hence, co-production refers to the participation of the customer in the co-production of a supplier's value proposition (e.g. product, service), whereas value co-creation pertains to the situations, where suppliers together with their customers create the customer experience (i.e. co-creation of value experiences) (Kohtamäki and Rajala, 2016). Also, Kohtamäki and Rajala (2016) have concluded in their study, which has covered B2B researches with a focus on industrial services, that, in general, collaborative creation of value in B2B relations involves both co-production of value propositions and co-creation of value experiences.

Although being different concepts, both co-production of value proposition and co-creation of value experience involve the mobilization of customer's resources (Ordanini and Pasini, 2008). In the production stage, a customer provides, for example, their knowledge of the business process and market experience, which are then combined with the supplier's technical resources and competences to co-produce an offering (Ordanini and Pasini, 2008). In this sense, the value proposition is jointly designed by the supplier and the customer, thereby depending on the integration of their resources (Macdonald *et al.*, 2016). In this way, co-production takes place in joint inventiveness, joint production, and co-design (Terblanche, 2014). As for the co-creation, a customer also needs to use its resources, such as competences and skills, to employ the offering into its process (Ordanini and Pasini, 2008; Macdonald *et al.*, 2016).

However, customers do not act as co-producer voluntarily, because they often feel insecure about the usability of their information and resources (Aarikka-Stenroos and Jaakkola, 2012). Also, due to the knowledge asymmetry between customers and suppliers, inexperienced customers lack the necessary competencies to implement the offering in their process (Chih *et al.*, 2019). Therefore, these situations constitute obstacles that may hinder joint creation of value in industrial services (Aarikka-Stenroos and Jaakkola, 2012; Breidbach and Maglio, 2016; Chowdhury *et al.*, 2016).

Although some authors have mentioned the barriers of value co-creation, in the view of Chowdhury *et al.* (2016), there is a tendency in the current literature on value co-creation to highlight only its benefits. This tendency comprises a thorough understanding of the value co-creation process and thus jeopardizes its management (Heidenreich *et al.*, 2015). For this reason, in our study, we aim to recognize the positive aspects (i.e. facilitators) along with the negative ones (i.e. inhibitors), and also to discuss whether even the facilitators could also have a dark side that hinders the jointly creation of value in industrial services.

### 3. Research methodology

The present study aims to recognize the facilitators and inhibitors of value co-creation in the industrial service environment. To achieve this goal, the authors performed two stages. In the first stage, the Systematic Literature Review (SLR) was employed to recognize the state-of-

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the-art of facilitators and inhibitors of value co-creation in B2B-related industrial services. Thereafter, the content analysis proposed by [Bardin \(2011\)](#) was carried out to analyze the resulting portfolio from the SLR.

The SLR adopted in this study follows the six-step process recommended by [Jesson et al. \(2011\)](#) and [Ferenhof and Fernandes \(2016\)](#), which is described here:

- (1) Field mapping through a scoping review;
- (2) Comprehensive research;
- (3) Quality assessment, which includes the reading and the selection of papers;
- (4) Data extraction, which relates to the collection and capture of relevant data into a pre-designed spreadsheet;
- (5) Synthesis, which comprises the synthesis of extracted data to show the known and to provide the basis for establishing the unknown; and
- (6) Write up

First, to map the literature, we defined the research questions of interest, the keywords, the search strings, and set up the inclusion and exclusion criteria. The research questions were: Does the paper address B2B relations? "Which were the main findings of the papers?" and "Do these findings show factors or elements that ease and/or hinder the joint creation of value?". As keywords, it was decided to use "industrial service," "service industry," "service industries," "co-creation," "co-production" and "cocreation." To define the search strings, the authors generated and calibrated them based on the keywords and Boolean operators. Thus, the authors made diverse combinations with the Boolean operators and keywords until suitable strings were generated. After multiple combinations, the authors found out that the following search strings ("industrial service" OR "service industry" OR "service industries") AND ("co-creation" OR "co-production" OR cocreation)) returned good enough results. The inclusion criteria were: peer-reviewed academic papers in English from Ebescio, Compendex, Emerald, Web of Science, Science Direct, Scopus databases and B2B relations. Thus, grey literature such as reports and non-academic research, other languages than English, other databases than the previously mentioned, and B2C relationships were considered as exclusion criteria. Also, we created an electronic spreadsheet consisting of critical aspects related to the research objective. These critical aspects were the name of the author(s), year of publication, name of the journal, key findings, and classification thereof into facilitators (i.e. elements that ease the joint creation of value) or inhibitors (i.e. factors that jeopardize the joint creation of value).

Second, one of the authors accessed the six databases and searched using the search strings. This research was made on March 26, 2019, and returned 1,288 hits, that 78 were duplicates resulting in 1,210 papers, as illustrated in [Table 1](#).

Third, the authors individually examined the title, abstracts, and keywords of the 1,210 papers, which reduced the number of relevant documents in 128. Then, each author read the introduction and the conclusion sections of the respective articles to ensure that they actually fell within the pre-defined scope. This evaluation yielded a final selection of 84 papers, which fulfilled the research criteria and were analyzed through the content analysis as detailed in the fourth step below.

Fourth, to analyze the remaining 84 documents, the authors carried out the content analysis recommend by [Bardin \(2011\)](#). According to this author the content analysis comprises the following three phases:

- (1) Pre-analysis, which involves the material (*corpus*) selection to be analyzed (e.g. articles) and its thorough reading;

JSTP 30,6	Database	Number of publications
	<i>Science direct</i>	584
	<i>Emerald</i>	473
	<i>Scopus</i>	78
	<i>Compendex</i>	63
	<i>Web of science</i>	59
<b>614</b>	<b>Ebsco</b>	31
	Total	1,288
	Duplicates	-78
	Resulting SLR total	1,210
<b>Table 1.</b> Resulting SLR papers	<b>Source(s):</b> Authors	

- (2) Exploration of the material or coding, in which the record unit (i.e. words, sentences or themes repeated throughout the *corpus*), the context unit (i.e. paragraphs or phrases taken from the *corpus* that frames the record unit and clarify its meaning) and rules to compute the register unit (e.g. presence, absence, frequency or intensity) are defined;
- (3) Treatment of results, inference, and interpretation, in which the findings are summarized in tables, diagrams, figures, or models, thereby highlighting the results from the analysis.

To do the pre-analysis, each author read in full the previously selected 84 papers and entered the main findings and the classification thereof into facilitators and inhibitors in the electronic spreadsheet. By doing so, the authors found out that among the 84 documents, 54 addressed facilitators (Table 2), and 30 approached the inhibitors (Table 3) of value co-creation in the industrial services.

In the coding phase, the tasks were divided among two authors; thus, one author analyzed the facilitators and the other inhibitors. To define the context units, the author responsible for the facilitators gathered and listed citations from the 54 papers showing the elements that ease the process of joint creation of value in industrial services, whereas the author in charge of inhibitors collected and listed phrases addressing the factors that jeopardize this process. To determine the record units (i.e. the facilitators and inhibitors of value co-creation in industrial services), the citations, and phrases (i.e. context units) were scrutinized to figure out the most cited themes thereof, which were then used to label the facilitators and inhibitors. Subsequently, the authors calculated the frequency of the register units.

In the final phase of the content analysis, drawing upon the findings on facilitators and inhibitors, the two authors created individually tables to summarize and highlight the results from the content analysis.

Fifth, the two tables from the content analysis were synthesized into one single file. Then, the authors joint analyzed it and discussed the findings until convergence, ensuring, thereby, the coherence of the coding of the context unit and record unit.

Sixth, on the final stage of the SLR, the authors focused on the writing up of the findings.

#### 4. Results and discussion

Drawing upon the content analysis, whose steps were detailed in section 3, eleven record units were generated for the facilitators, as illustrated in Table 4.

Regarding the inhibitors, four record units were created (see Table 4)

Code	Authors	Year	Title	Documents
A1	Aarikka-Stenroos and Jaakkola	2012	Value co-creation in knowledge-intensive business services: A dyadic perspective on the joint problem-solving process	Industrial Marketing Management
A2	Breidbach and Maglio	2016	Technology-enabled value co-creation: An empirical analysis of actors, resources, and practices	Industrial Marketing Management
A3	Chen <i>et al.</i>	2011	Co-production and its effects on service innovation	Industrial Marketing Management
A4	Dahan <i>et al.</i>	2010	Corporate-NGO collaboration: Co-creating new business models for developing markets	Long Range Planning
A5	de Faria <i>et al.</i>	2010	Cooperation in innovation activities: The importance of partners	Research Policy
A6	Enz and Lambert	2012	Using cross-functional, cross-firm teams to co-create value: The role of financial measures	Industrial Marketing Management
A7	Greer <i>et al.</i>	2016	A service perspective: Key managerial insights from service-dominant (S-D) logic	Organizational Dynamics
A8	Grönroos and Helle	2010	Adopting a service logic in manufacturing: Conceptual foundation and metrics for mutual value creation	Journal of Service Management
A9	Hakanen and Jaakkola	2012	Co-creating customer-focused solutions within business networks: a service perspective	Journal of Service Management
A10	Heim <i>et al.</i>	2018	Value co-creation in ICT services company: A case Study of a cross-border acquisition	Journal of East-West Business
A11	Hsieh and Lee	2012	A note on value creation in consumption-oriented regional service clusters	Competitiveness Review
A12	Hsieh <i>et al.</i>	2012	Strategy and process of value creation and appropriation in service clusters	Technovation
A13	Immonen <i>et al.</i>	2016	Antecedents of system purchasing in B2B services	Journal of Purchasing and Supply Management
A14	Ippolito	2009	Creating value in multiple cooperative relationships	International Journal of Quality and Service Sciences
A15	Jaakkola and Hakanen	2013	Value co-creation in solution networks	Industrial Marketing Management
A16	Kohtamaki and Helo	2015	Industrial services – the solution provider’s stairway to heaven or highway to hell?	Benchmarking-an International Journal
A17	Kohtamaki and Partanen	2016	Co-creating value from knowledge-intensive business services in manufacturing firms: The moderating role of relationship learning in supplier-customer interactions	Journal of Business Research
A18	Kohtamäki <i>et al.</i>	2013	Non-linear relationship between industrial service offering and sales growth: The moderating role of network capabilities	Industrial Marketing Management
A19	Komulainen	2014	The role of learning in value co-creation in new technological B2B services	Journal of Business and Industrial Marketing

(continued)

**Table 2.**  
Documents addressing  
facilitators of value co-  
creation in industrial  
services

Code	Authors	Year	Title	Documents
A20	Koskela-Huotari and Vargo Stephen	2016	Innovation in service ecosystems—Breaking, making, and maintaining institutionalized rules of resource integration	Journal of Business Research
A21	Lai <i>et al.</i>	2017	Shifting paradigm to service-dominant logic via internet-of-things with applications in the elevators industry	Journal of Management Analytics
A22	Lee <i>et al.</i>	2012	Co-innovation: cover genomics, collaboration, and co-creation for organizational values	Management Decision
A23	Lombardo and Cabiddu	2017	What's in it for me? Capital, value and co-creation practices	Industrial Marketing Management
A24	Makkonen <i>et al.</i>	2018	"Shopping for Items" or "Partnering for Performance"? A framework of purchasing practices for value co-creation in post-outsourcing buyer-supplier relationships	Journal of Business and Industrial Marketing
A25	Marcos-Cuevas <i>et al.</i>	2016	Value co-creation practices and capabilities: Sustained purposeful engagement across B2B systems	Industrial Marketing Management
A26	Martinez-Fernandez and Miles	2006	Inside the software firm: Co-production of knowledge and KISA in the innovation process	International Journal of Services, Technology and Management
A27	Mention	2011	Co-operation and co-opetition as open innovation practices in the service sector: Which influence on innovation novelty?	Technovation
A28	Mills <i>et al.</i>	2013	Enterprise imaging: representing complex multiorganizational service enterprises	International Journal of Operations and Production Management
A29	Morgan <i>et al.</i>	2007	Branding implications of partner firm-focal firm relationships in business-to-business service networks	Journal of Business and Industrial Marketing
A30	Murthy <i>et al.</i>	2016	An empirical investigation of the antecedents of value co-creation in B2B IT services outsourcing	Business Process Management Journal
A31	Nätti <i>et al.</i>	2014	The intermediary role in value co-creation within a triadic business service relationship	Industrial Marketing Management
A32	Ng <i>et al.</i>	2013	Outcome-based contracts as new business model: The role of partnership and value-driven relational assets	Industrial Marketing Management
A33	Oertzen <i>et al.</i>	2018	Co-creating services—conceptual clarification, forms and outcomes	Journal of Service Management
A34	Rexfelt <i>et al.</i>	2011	A proposal for a structured approach for cross-company teamwork: A case study of involving the customer in service innovation	Research in Engineering Design
A35	Rod <i>et al.</i>	2014	Managerial perceptions of service-infused IORs in China and India: A discursive view of value co-creation	Industrial Marketing Management
A36	Rogers and Clark	2016	CABS: a conceptual model for context-aware B2B sales applications	Journal of Research in Interactive Marketing

Table 2.

(continued)



Code	Authors	Year	Title	Documents
A37	Rossi <i>et al.</i>	2017	Academic engagement as knowledge co-production and implications for impact: Evidence from Knowledge Transfer Partnerships	Journal of Business Research
A38	Ruiz-Alba <i>et al.</i>	2018	Servitization strategies from customers' perspective: the moderating role of co-creation	Journal of Business and Industrial Marketing
A39	Russo <i>et al.</i>	2017	The role of facilitators as partial signalers in the context of value perception	International Journal of Quality and Service Sciences
A40	Sakai and Hidaka	2018	Aiming for digital business innovation by expanding services for co-creation	Fujitsu Scientific and Technical Journal
A41	Santos-Vijande <i>et al.</i>	2016	Frontline employees' collaboration in industrial service innovation: routes of co-creation's effects on new service performance	Journal of the Academy of Marketing Science
A42	Schwetschke and Durugbo	2018	How firms synergise: Understanding motives and management of co-creation for business-to-business services	International Journal of Technology Management
A43	Singh and Paliwal	2012	Customers' value appraisals-suppliers' value propositions interaction process in developing new services: A case study from the natural gas industry	International Journal of Energy Sector Management
A44	Smedlund	2008	Identification and management of high? potential professional services	Management Decision
A45	Thiruvattal	2017	Impact of value co-creation on logistics customers' loyalty	Journal of Global Operations and Strategic Sourcing
A46	Tsou <i>et al.</i>	2015	Selecting business partner for service delivery co-innovation and competitive advantage	Management Decision
A47	Tsou and Hsu	2015	Performance effects of technology-organization-environment openness, service co-production, and digital-resource readiness: The case of the IT industry	International Journal of Information Management
A48	Wang <i>et al.</i>	2016	The impact of sellers' social influence on the co-creation of innovation with customers and brand awareness in online communities	Industrial Marketing Management
A49	Wang <i>et al.</i>	2013	Customer participation and project performance: The mediating role of knowledge sharing in the Chinese telecommunication service industry	Journal of Business-to-Business Marketing
A50	West <i>et al.</i>	2018	Co-creation of value in product-service systems through transforming data into knowledge	IFAC-PapersOnLine
A51	Zhang and He	2014	Key dimensions of brand value co-creation and its impacts upon customer perception and brand performance: An empirical research in the context of industrial service	Nankai Business Review International

(continued)

Table 2.

Code	Authors	Year	Title	Documents
A52	Zhang <i>et al.</i>	2016	How brand orientation impacts B2B service brand equity? An empirical study among Chinese firms	Journal of Business and Industrial Marketing
A53	Zhang <i>et al.</i>	2016	Innovating through services, co-creation and supplier integration: Cases from China	International Journal of Production Economics
A54	Zhao and Cheng	2017	A value co-creation approach to industrial product-service systems	International Journal of Services Operations and Informatics

Table 2.

Source(s): Authors

#### 4.1 Value co-creation facilitators

From the content analysis (see Table 4), the authors identified eleven facilitators (record units) for the co-creation of value in industrial services, namely: (1) involvement of actors, (2) synergy among participants, (3) resource complementarity, (4) personal relationships between actors, (5) value compatibility, (6) specialized knowledge, (7) trust, (8) geographical proximity, (9) information exchange through technology, (10) the establishment of a network, and (11) governance.

Concerning the facilitator “involvement of actors,” Oertzen *et al.* (2018) highlight that involvement, participation, and engagement are necessary prerequisites for the value co-creation in industrial services. Along this line, Storbacka *et al.* (2016) emphasize that without actors’ engagement, no resource integration occurs, which inhibits value co-creation, as the share of resources and competences by customers and suppliers into the service process (i.e. service co-production) antecedes service co-creation (Ordanini and Pasini, 2008). In this context, by bringing their resources into the service process, customers act as co-producers of the solution (Aarikka-Stenroos and Jaakkola, 2012), thereby enabling the decrease of the cost of service provision, which leads to an increased financial performance of the suppliers (Siahtiri, 2017).

However, customers do not always adopt the role of co-producer voluntary, because they often feel insecure towards the usability of their information and resources in value co-creation (Aarikka-Stenroos and Jaakkola, 2012). To remedy this situation, suppliers need to involve customers in the terms of motivating them to mobilize their resources into the process of joint creation of value (Aarikka-Stenroos and Jaakkola, 2012). Thus, the success of the value co-creation depends on the customer involvement, especially on their willingness to share information about their needs, their expectations, their objectives, and their business (Grönroos and Helle, 2010; Aarikka-Stenroos and Jaakkola, 2012; Hakanen and Jaakkola, 2012; Jaakkola and Hakanen, 2013; Breidbach and Maglio, 2016) along with their evaluation of the solution proposed by the supplier (Singh and Paliwal, 2012; Nätti *et al.*, 2014; Ruiz-Alba *et al.*, 2018).

Concerning the facilitator “synergy among participants”, the term synergy derive from the Greek word *synergos*, which means “working together” (Goold and Campbell, 1998). In this way, from a value co-creation perspective, this facilitator pertains to the interactions among actors that engender positive results, such as enhanced efficiency (Nevo and Wade, 2010). This greater efficiency derive from the synergy effect, which can be expressed in terms of “2 + 2 = 5” (Liu, 2019). That is to say, when companies interact collaboratively, they generate higher value than the sum of each partner could create alone (Goold and Campbell, 1998; Gyrd-Jones and Kornum, 2013; Liu, 2019). In this sense, under the value co-creation model, services companies benefit from the cooperation among stakeholders (Zhao

Code	Authors	Year	Title	Documents
B1	Todeva and Knoke	2005	Strategic alliances and models of collaboration	Management Decision
B2	de Faria <i>et al.</i>	2010	Cooperation in innovation activities: The importance of partners	Research Policy
B3	Enz and Lambert	2012	Using cross-functional, cross-firm teams to co-create value: The role of financial measures	Industrial Marketing Management
B4	Shamah	2012	Innovation within green service supply chains for a value creation	Journal Of Modelling In Management
B5	Stanworth	2012	Deep supply relationships: Influencing outcomes by managing supply service quality	Production Planning And Control
B6	Filieri <i>et al.</i>	2014	Structural social capital evolution and knowledge transfer: Evidence from an Irish pharmaceutical network	Industrial Marketing Management
B7	Lorgnier and Su	2014	Considering coopetition strategies in sport tourism networks: a look at the nonprofit nautical sports clubs on the northern coast of France	European Sport Management Quarterly
B8	Rod <i>et al.</i>	2014	Managerial perceptions of service-infused IORs in China and India: A discursive view of value co-creation	Industrial Marketing Management
B9	da Silva <i>et al.</i>	2015	Co-creation of value in road cargo transport: A case study	Producao
B10	Enquist <i>et al.</i>	2015	Transcendence for business logics in value networks for sustainable service business	Journal Of of Service Theory and Practice
B11	Gjerald and Lyngstad	2015	Service risk perceptions and risk management strategies in business-to-business tourism partnerships	Tourism Management Perspectives
B12	Jarratt and Ceric	2015	The complexity of trust in business collaborations	Australasian Marketing Journal (Amj)
B13	Mattera and Baena	2015	The key to carving out a high corporate reputation based on innovation: corporate social responsibility	Social Responsibility Journal
B14	Tsou <i>et al.</i>	2015	Selecting business partner for service delivery co-innovation and competitive advantage	Management Decision
B15	Vesalainen and Kohtamäki	2015	Toward a typological view of buyer-supplier relationships: Challenging the unidimensional relationship continuum	Industrial Marketing Management
B16	Chowdhury <i>et al.</i>	2016	Every cloud has a silver lining — Exploring the dark side of value co-creation in B2B service networks	Industrial Marketing Management
B17	Lusch <i>et al.</i>	2016	Fostering a trans-disciplinary perspectives of service ecosystems	Journal of Business Research
B18	Manser <i>et al.</i>	2016	An activities-based approach to network management: An explorative study	Industrial Marketing Management
B19	Razmdoost and Mills	2016	Towards a service-led relationship in project-based firms	Construction Management and Economics

(continued)

**Table 3.**  
Documents  
approaching inhibitors  
of value co-creation in  
industrial services

Code	Authors	Year	Title	Documents
B20	Skjølsvik	2016	Business-to-business professional service relationships under multiple logics	Service Industries Journal
B21	Ali-Marttila <i>et al.</i>	2017	Understand what your maintenance service partners value	Journal Of Quality In Maintenance Engineering Business Process
B22	Braun <i>et al.</i>	2017	Value co-creation in maintenance services: case study in the mechanical industry	Management Journal
B23	Chou <i>et al.</i>	2017	Inter-firm relational resources in cloud service adoption and their effect on service innovation	Service Industries Journal
B24	Saunila <i>et al.</i>	2017	Gaining insights into the measurement of value in industrial service network	International Journal Of Quality and Reliability Management
B25	Zhao <i>et al.</i>	2017	Institutionalized place branding strategy, interfirm trust, and place branding performance: Evidence from China	Journal Of Business Research
B26	Aaldering <i>et al.</i>	2018	Analyzing the impact of industry sectors on the composition of business ecosystem: A combined approach using ARM and DEMATEL	Expert Systems With Applications
B27	Schwetschke and Durugbo	2018	How firms synergise: Understanding motives and management of co-creation for business-to-business services	International Journal Of Technology Management
B28	Wang <i>et al.</i>	2018	A critical view of knowledge networks and innovation performance: The mediation role of firms' knowledge integration capability	Journal Of Business Research
B29	Bouzidine-Chameeva <i>et al.</i>	2019	Value co-creation in wine logistics: The case of DARTESS	Ieee Engineering Management Review
B30	Franklin and Marshall	2019	Adding co-creation as an antecedent condition leading to trust in business-to-business relationships	Industrial Marketing Management

Table 3.

Source(s): Authors

and Cheng, 2017), because it is the basis for developing synergy in the business environment (Holubčík and Soviar, 2016), and thus, one of the essential factors for co-creating value in B2B relations (Zhang *et al.*, 2016a; Schwetschke and Durugbo, 2018).

According to Goold and Campbell (1998), one of the forms to create business synergy by firms collaboratively working is through the share of tangible resources. By sharing a physical asset, for example, a shared manufacturing facility, firms may gain economies of scale and avoid duplicated effort (i.e. enhanced efficiency) (Goold and Campbell, 1998). However, Harrison *et al.* (2001) have not limited synergy to the share of tangible resources. In their studies, they have confirmed that companies create synergy by sharing complementary assets.

Complementarity resources are the ones that though different, complement each other and thus generate higher value when combined (Harrison *et al.*, 2001; Mitsuhashi and Greve, 2009). They encompass either physical assets or intangible resources (e.g. knowledge) (Greve *et al.*, 2013). For this reason, technological innovation often results from the combination of the distinct resources from small firms and large ones (King *et al.*, 2003). Different sized organizations characteristically possess complementarity assets (King *et al.*, 2003). Along this line, Hitt *et al.* (2000) have demonstrated that companies seek for partners for collaboration who complement them in terms of resources and skills. Therefore, "resource

Record unit	Context unit	Frequency
Involvement of actors	<p>A1 – customers contribute to the solution of the problem by providing information about their needs, their goals, and their businesses</p> <p>A2 – for the success of a project, the customer needs to provide information in time, and with the right quality to his supplier</p> <p>A8 – customer needs to share information with the supplier</p> <p>A9 – customers willing to share information openly about their goals, needs, and expectations contribute to the formulation of the solution</p> <p>A15 – customers have contributed to the solution of the process by informing their preferences, their problems, and their business goals</p> <p>A19 – for the success of the co-creation, customer needs to be involved and use their ability to learning how to implement the solution</p> <p>A22 – clients well informed are actively involved in working with companies to create value</p> <p>A31 – to benefit fully from service, customers can take a more active role in the adaptation of offerings for their own needs</p> <p>A33 – participation, involvement, and engagement of customer and supplier are prerequisites for the co-creation of services</p> <p>A38 – costumers need to be involved in the value co-creation</p> <p>A43 – the involvement of the customer ensures that the resources offered by the supplier are used more efficiently</p>	11
Synergy among participants	<p>A7 – generation of knowledge occurs by the interaction between companies, clients and suppliers</p> <p>A8 – interactions generate opportunities for the supplier to co-create value</p> <p>A13 – the integration of strategic services requires a mutual connection among the partners</p> <p>A17 – learning in value co-creation only occur when there is an interaction between the supplier and the customer</p> <p>A24 – the excellent performance of a partnership requires open communication and collaboration between the parties involved</p> <p>A36 – all process steps involve collaboration</p> <p>A37 – the processes of co-production of knowledge depends heavily on continuous interactions among the participants</p> <p>A41 – direct contact with customers facilitates the identification of their needs</p> <p>A42 – a collaboration between the participants is one of the essential factors for co-creation in B2B</p> <p>A52 – interactions among stakeholders are crucial to the co-creation of value in industrial services</p> <p>A54 – under the value co-creation model, services companies benefit from the cooperation among stakeholders</p>	11

(continued)

**Table 4.**  
Facilitators of value co-creation

Record unit	Context unit	Frequency
Resource complementarity	<p>A6 – higher value is co-created when resources are combined in the form of cross-functional teams</p> <p>A8 – complementary resources enable successful co-creation of value</p> <p>A9 – the co-creation of the solution is affected by the complementary resources from the supplier</p> <p>A15 – the main reason for the actors co-create value was the need to gain access to complementary resources</p> <p>A27 – companies need to access and combine knowledge, to achieve higher degrees of innovation</p> <p>A28 – few organizations can create a complete solution with their resources. Thus, companies engage in collaborative relationships to access the resources of their partners</p> <p>A32 – complementary resources contribute to a more symmetric transfer of resources during the co-production of service</p> <p>A42 – in B2B relationships, firms try to acquire resources and capabilities they lack</p> <p>A42 – complementary resources leverage the joint creation of value</p> <p>A46- organizations are rarely self-sufficient. Hence, they enter into collaborative relationships with other companies to obtain critical resources</p>	10
Personal relationships among actors	<p>A3 – friendship contributes significantly to the success of the cooperation</p> <p>A9 – customers highlighted the importance of personal relationships on value perception</p> <p>A23 – the interpretation of relationships among service providers and their clients provides a more vibrant vision about the social mechanisms that sustain value co-creation practices in marketing B2B</p> <p>A30 – an alliance between actors has a positive and significant impact on value co-creation</p> <p>A34 – a friendly environment is essential to motivate the participants in the co-creation to achieve the necessary results</p> <p>A44 – new services are co-produced from a close relationship with the client</p> <p>A49 – frequent interactions and friendship building activities can generate a platform to engage customers in knowledge sharing</p> <p>A50 – co-creation of value only occurs if there is a robust personal integration within the ecosystem</p> <p>A51 – the personal relationship between partners is a critical antecedent to the services industries</p> <p>A53 – value co-creation requires close relationships among the partners of the network</p>	10

Table 4.

(continued)

Record unit	Context unit	Frequency
Value compatibility	<p>A3 – similar philosophy and similar management cause synergy, generating benefits for the teamwork</p> <p>A4 – the importance of compatibility of interests between NGOs and the multinationals to the co-creation of new business models</p> <p>A14 – the creation of an effective system of values requires that the different partner companies share the same goals concerning the business idea</p> <p>A25 – similar culture and professional identification facilitate the formulation of a common goal for the co-creation</p> <p>A40 – all participants must agree with the objectives to be achieved by the co-creation of value</p> <p>A42 – cultural alignment is a prerequisite for collaboration</p> <p>A45 – to enhance the co-creation of value and, consequently, have greater organizational efficiency, managers need to involve working groups in activities focused on alignment and adaptability</p> <p>A46 – collaboration is facilitated and has its effect increased when the partners have compatible cultures</p> <p>A48 – the identification between the participants have a positive impact on co-creation</p>	9
Specialized knowledge	<p>A1 – experienced suppliers with specialized knowledge, improve the co-design and the co-production of the solution</p> <p>A3 – the experience and skills of the partner, have a significant and positive contribution to the co-creation</p> <p>A25 – capacities are mechanisms that provide coherence and integration and result in co-creation</p> <p>A29 – the partner firm's knowledge affects co-creation outcomes</p> <p>A39 – highly qualified professionals act as facilitators</p> <p>A42 – partners were chosen due to their specialized knowledge in the area</p> <p>A46 – partners with specialized knowledge are more likely to promote collaboration</p> <p>A49 – without a solid base of knowledge or experience in a specific technology area, costumers cannot contribute significantly to the project</p>	8
Trust	<p>A8 – trust is an antecedent of the co-creation of value</p> <p>A9 – trust in the competence of the partner is an essential condition for cooperation</p> <p>A10 – trusty relationships can improve interactions among the actors and, therefore, facilitate the development of new business opportunities</p> <p>A25 – trust and emotional ties hold actors together</p> <p>A31 – trust is an essential prerequisite of co-creation</p> <p>A35 – value co-creation is more evident when managers realize that they are in trusted relationships</p> <p>A42 – trust is a priority and a fundamental prerequisite for cooperation</p> <p>A46 – to support a collaborative approach, firms must be able to develop the trust and commitment necessary among partners</p>	8

(continued)

Table 4.

Record unit	Context unit	Frequency
Geographical proximity	A5 – companies within the same group develop cooperation activities effectively A11 – companies located within a service cluster gain competitive advantage by lowering production costs A12 – geographical proximity facilitates communication and collaboration A27 – firms rely more on information shared by companies within the same group A42 – geographical proximity facilitates inter-firm alignment and integration	5
Information exchange through technology	A21 – shared information critical element for value co-creation it is fully aligned with IoT, that makes information movement more transparent and more efficient A36 – technology improves the process of co-creation of value co-creation by allowing the access to relevant information A47 – technology facilitates the co-creation of services by allowing companies to be better integrated with their partners A47 – digital process facilitates collaboration by improving information quality	4
The establishment of a network	A16 – firms depend on network capabilities to effectively absorb knowledge from services interactions A18 – regarding industrial services, network capabilities facilitate value co-creation A26 – organizations in the network space of the firm build the knowledge network imperative for the innovation A42 – to reduce the risk of cooperation failure, firms should establish a vast network	4
Governance	A20 – institutionalized rules facilitate innovation A30 – norms for sharing of intellectual property enhance the inter-firms' relationship A42 – governance covers topics such as privacy policies, intellectual property, financial conditions, and contractual arrangements A42 – the success of value co-creation relies on the establishment of standards and norms	4

**Table 4.** Source(s): Authors

complementary” can also be considered as a facilitator for co-creating value in B2B relations, as this asset encourages inter-firm collaboration by easing access to critical assets (Mitsuhashi and Greve, 2009).

Owning to the fact only a few organizations can independently create a complete solution with their capabilities, firms enter into collaborative partnerships to access resources and skills they lack (i.e. complementary resources) (Hakanen and Jaakkola, 2012; Jaakkola and Hakanen, 2013; Tsou *et al.*, 2015; Schwetschke and Durugbo, 2018). This collaboration, in turn, provides a foundation for organizational learning (Inkpen, 2005) because when one partner offers resources different from the ones already possessed by the other party, it motivates communication and learning from the other (Harrison *et al.*, 2001; Chang *et al.*, 2019). This learning process reduces the possibility of knowledge dissipation and leads to competitive advantage (Powell, 1987). Because when a firm learns from its partners, it can combine its existing knowledge with theirs to expand its intellectual capital,



opening up opportunities for creating new services and/or products (Martin-Rios and Erhardt, 2017; Wang *et al.*, 2018).

Nevertheless, Chang *et al.* (2019) argue that the effect of knowledge complementarity is only positive for value co-creation at a certain level. According to them, when there is too much difference, partner's common understanding is limited, which reduces the efficiency of integration and creation process. This is aligned with concept of "resourceness." According to Lusch and Vargo (2014), resourceness reflects the ability of potential resources to achieve something desirable through the process of human appraisal. In other words, resourceness is determined by the actors skills and knowledge, that when applied to other resources, generates benefits for itself and/or other organizations (Lusch and Vargo, 2014; Koskela-Huotari and Vargo Stephen, 2016; Lim and Maglio, 2019). In this sense, when actors lack of understanding and knowledge, they do not have the power to unleash the potential of the complementarity resources, shared by the partners. Therefore, resourceness becomes a prerequisite to integrate complementarity assets in value co-creation (Koskela-Huotari and Vargo Stephen, 2016).

In terms of the facilitator "personal relationship between actors," friendship plays a great role in value co-creation. According to Chen *et al.* (2011) when actors have a friendship bond, they appreciate their partner's well-being and, thus, commit deeply to the joint creation of value to ensure their partners' success. Also, personal relationships and the affinity among participants bring in partners closer, thereby providing better actor's integration within the value co-creation process (Hakanen and Jaakkola, 2012; Wang *et al.*, 2013; Zhang and He, 2014; Zhang *et al.*, 2016b). Along this line, Tommasetti *et al.* (2017) point out that in interactive services areas such as education, in which customers and suppliers has a close relationship, customers assume a more proactive posture towards co-creating value. Therefore, to perform a successful joint creation of value in industrial services, firms need to take personal relationships into account (Lombardo and Cabiddu, 2017).

Concerning the "value compatibility," this facilitator comprises shared business philosophies and compatible cultures that promote harmonious inter-firm relationships (Chaurasia, 2018), in which the synergy among actors foster teamwork, that enhances the organizational efficiency (Chen *et al.*, 2011; Tsou *et al.*, 2015; Thiruvattal, 2017).

So, good B2B relationships are maintained due to the similarities among firms (Mitsuhashi and Greve, 2009). These similarities strengthen work relations and facilitates communication among the actors involved in the joint creation of value (Chang *et al.*, 2019), thereby easing the agreement among the parties on setting the goals of value co-creation (Marcos-Cuevas *et al.*, 2016; Santos-Vijande *et al.*, 2016).

The "specialized knowledge" facilitator encompasses the partner's expertise and experience, thereby being central for developing original solutions that increase value co-creation outcomes (Chang *et al.*, 2019). In addition to generating innovative solutions, professional knowledge also supports customers in making better decisions (Aarikka-Stenroos and Jaakkola, 2012). In this way, highly qualified suppliers act as facilitators in value co-creation as their knowledge and their skills improve and positively affect the co-production of the solution (Chen *et al.*, 2011; Aarikka-Stenroos and Jaakkola, 2012; Russo *et al.*, 2017).

However, specialized knowledge can jeopardize the joint production of value due to the knowledge asymmetry (i.e. inexperienced customers do not have sufficient expertise to understand and to employ the technological solution designed by specialized suppliers) (Chih *et al.*, 2019). This has to do with the concept of "resourceness," already discussed in the paragraphs addressing the facilitator "resource complementary". That is to say that resources from customers (knowledge and skills) determine the "resourceness" of the supplier's resources (Lusch and Vargo, 2014; Koskela-Huotari and Vargo Stephen, 2016). More specifically, customers need to use their expertise to act upon the assets from suppliers

(technological solution), so that their potential to create a benefit is unleashed. Thus, to perform a successful value co-creation, all the parties involved need to have a similar knowledge level (Chih *et al.*, 2019).

The “trust” facilitator is one of the vital requirements for collaboration and the most relevant for the value co-creation (Grönroos and Helle, 2010; Hakanen and Jaakkola, 2012; Nätti *et al.*, 2014; Schwetschke and Durugbo, 2018). Trust is the confidence that each actor involved will act as agreed and genuinely take each other’s welfare into account while making a decision (Day *et al.*, 2013). Indeed, trusted relationships deepen ties among stakeholders and improve value co-creation performance in B2B relations (Rod *et al.*, 2014; Marcos-Cuevas *et al.*, 2016; Heim *et al.*, 2018). This is because in inter-firm collaboration, trustworthy relations eases the knowledge transfer (Corsaro, 2015). Once an organization trusts its partners, it tends to control less the knowledge flow across organizational boundaries and are more willing to not restrict the amount of knowledge to which they are exposed (Norman, 2002).

However, Franklin and Marshall (2019) disagree that trust is a requirement for the joint creation of value. According to the authors, to build trust, first, the actors need to co-create value (i.e. value co-creation is a prerequisite for partners to create trustworthy relations and not the opposite). Moreover, Chih *et al.* (2019) do not perceive trust as a facilitator; on the contrary, they point out that its lack can lead to better value co-creation outcomes. In the view of these actors, customers, who mistrusted their partners, became further engaged in value co-creation project and applied their specialist ability to confront the solutions recommended by their partners, which drew better services and results. This is may be related to what Gargiulo and Benassi (2000) label “relational inertia.” This term refers to the relational bond of highly trusted relationships that weakens partners’ perception towards recognizing emerging signs of declining performance (Gargiulo and Ertug, 2006; Day *et al.*, 2013). Therefore, high levels of trust may limit the potential of collaborative relations for co-creating value (Wang *et al.*, 2019).

The “geographic proximity” facilitator promotes benefits such as face-to-face communication that facilitates the absorption of tacit knowledge (Liu and Ma, 2019), and reduced operating costs (Hsieh and Lee, 2012). Nevertheless, Letaifa and Rabeau (2013) do not regard geographic proximity as a facilitator. On the contrary, these actors argue that is the geographic distance that drives entrepreneurship and innovation, and, thus, enhances value co-creation outcomes.

In terms of the facilitator “information exchange through technology,” the information technologies enhance inter-firm cooperation by improving the information flow among the stakeholders (Tsou and Hsu, 2015; Rogers and Clark, 2016). In this regard, Lusch and Vargo (2008) affirm that the flow of information in value co-creation must be symmetrical (i.e. stakeholders must have equal access to relevant information) actually to generate positive results. An option to maintain the flow of information symmetrical is the integration of IoT (internet of things) technology into the process of joint creation of value. Because IoT makes the flow of information more transparent and efficient (Lai *et al.*, 2017) and increases the availability of reliable data, and thus creates opportunities for process optimization, and business model innovation (Eloranta and Turunen, 2018).

As for the facilitator “the establishment of a network,” it fosters value co-creation, as firms cooperate with their network of partners to develop solutions and to create innovations (Martinez-Fernandez and Miles, 2006; Kohtamäki *et al.*, 2013; Hedvall *et al.*, 2019). Within the network, firms co-create value with their partners to access capabilities and transfer knowledge, so, the establishment of a network ensures competitive advantage (Kohtamäki and Helo, 2015; Schwetschke and Durugbo, 2018).

Finally, the facilitator “governance” corresponds to formal or informal rules (Roser *et al.*, 2013), that partners set to regulate each party’s contribution to co-creation (Hadaya and Cassivi, 2012). These rules reduce the chance of partner to act opportunistically,

because by performing so, they face penalties (Norman, 2002). Thus, governance facilitates co-creation by avoiding opportunistic behavior and the loss of intellectual property during the process of joint creation of value (Schwetschke and Durugbo, 2018).

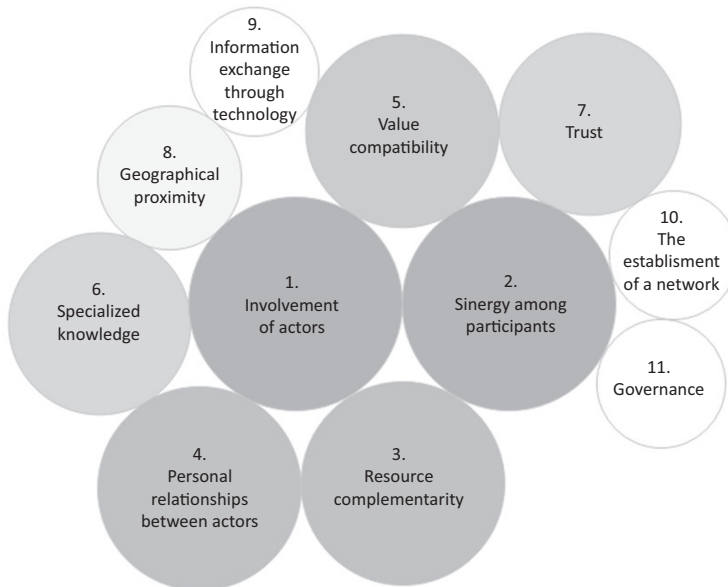
However, partners under tight controls may feel less willing to contribute for value co-creation, as freedom is essential to create empowerment for the parties (Wang *et al.*, 2019). In this sense, strict rules jeopardize value co-creation outcomes (Wang *et al.*, 2019). To avoid this, organizations should select trusted partners to co-create value. Because, when partners trust each other, they become less dependent upon these structural norms (Norman, 2002). As already mentioned in the discussion of the “Trust” facilitator, trust is the confidence that the partner will act as promised (Day *et al.*, 2013). Hence, the “Trust” facilitator reduces the need for rules to control the partner’s actions, thereby limiting the requirement for the “Governance” facilitator (Das and Teng, 1998; Norman, 2002).

Figure 1 summarizes the eleven value co-creation facilitators, in which the circle’s size and color tone represent the frequency of each facilitator (see Table 4).

#### 4.2 Value co-creation inhibitors

In terms of the inhibitors of value co-creation (see Table 5), the authors identified four record units: Incompatibility between actors, Inexperience in the context of value co-creation, Lack of measurement of value co-creation and the opportunism in sharing information.

The “incompatibility between actors” refers to the differences between the organizational cultures of the firms involved in the joint creation of value, which approach variables such as age and size of the firm, international patenting experiences and research and development intensity, as well as different fields of technology development (Wang *et al.*, 2018). These differences can hamper the set of a common goal for value co-creation (Enz and Lambert, 2012; Mattera and Baena, 2015; Manser *et al.*, 2016). So, to co-create, firms need to set a cooperation agreement to overcome their divergences (Todeva and Knoke, 2005). Although



Source(s): Authors

**Figure 1.**  
The facilitators of  
value co-creation in  
industrial services

Record unit	Context unit	Frequency
Incompatibility between actors	<p>B1 – Organizations asymmetries, efforts to adapt to new structures, routines and practices demanded from cooperation agreements</p> <p>B2 – Different importance levels of cooperation; The partners' importance is properly understood only when actors cooperate</p> <p>B5 – The measurement of the level of B2B service quality considers actors as homogeneous and does not take into consideration the heterogeneous variables of companies</p> <p>B6- Individualist academic work standards versus team-based industry work standards</p> <p>B7 – Problems of loss of autonomy, asymmetry in relationships and conflict of loyalty</p> <p>B13 – Companies may have different perceptions of the concept of value creation and the development of human capital</p> <p>B16 – Incompatibility of values, beliefs and working conditions among actors may affect their decisions</p> <p>B18 – Barriers in managing the network because of the actors' distinct willingness to commit to contractual arrangements</p> <p>B26 – Technologies' incompatibility of shared platforms and frequency asymmetry of actors' activities on platforms</p> <p>B28 – Heterogeneous variables such as age and size of each company; financial performance; absorption or not of resources; network size; international patenting experiences and research and development intensity; different fields of technology development</p> <p>B29 – Lack of standardization of messages and technologies shared among actors in B2B relations</p>	11
Actors' inexperience in the context of value co-creation	<p>B2 – The inexperience of one or more actors may generate divergence in the degrees of importance for each decision; The importance of value co-creation non is only understood by those who cooperate in the B2B relationship</p> <p>B5 – Managers' limited experience in value co-creation in the B2B context may stem from the fact that value-adding studies do not emphasize relationships; The B2B service relations are still poorly understood</p> <p>B8 – Value co-creation actors are not only interested in solutions but also in gaining know-how; Relationship expressions may give the impression of imposing solutions or sharing information</p> <p>B10 – A deeper understanding of business logic in a value creation network is required to achieve and secure sustainable business</p> <p>B11 – Inexperienced have difficulties following a benchmark regarding competence, service skills, and market expectations and information</p> <p>B12 – Experience is gained during a long-term relationship; a partnership can only exist when partners trust each other</p> <p>B17 – Managing companies' inexperience in value co-creation determines their resilience</p> <p>B21 – Without good information management, especially with the most complex technologies, communication problems appear, increasing risks such as depending on a supplier making the process less flexible</p> <p>B30 – Actors establish trust ties only after the experience of joint generating value</p>	9

**Table 5.**  
Inhibitors of value co-creation

*(continued)*

Record unit	Context unit	Frequency
Lack of measurement of value co-creation	<p>B3 – The concept of value creation is directly linked to financial gains. Therefore, the lack of measurement of the co-created value prevents managers from seeing the true benefit of this relationship. Determining metrics is challenging because the co-created value is a multidimensional and perceptual construction among companies</p> <p>B4 – One of the barriers to co-create value is the difficulty of accurately measuring the productivity of activities that require a creative and joint effort</p> <p>B5 – Existing measures of the level of B2B service quality treat companies homogeneously, but firms are heterogeneous</p> <p>B14 – Competitive advantage is difficult to measure</p> <p>B15 – Correlations between trust and performance are not unique in measuring a good partnership, which still leaves decisions very open for further analysis</p> <p>B24 – The difficulty in measuring value co-creation results is due to the lack of data standardization</p> <p>B27 – Managing and measuring co-created value is difficult as trust can lead to vulnerability</p>	7
Opportunism in sharing information	<p>B1 – Companies tend to protect their core business and choose only their peripheral business to form a partnership, so they feel less vulnerable by sharing confidential information</p> <p>B6 – Different knowledge and dissimilar resources may be complementary in B2B relations, however, by sharing competencies exists the risk of the loss of intellectual property and of opportunistic behavior</p> <p>B9 – With customized services, the offers' abundance induces competition and not co-creation's projects, demotivating one party and concentrating the value-added on the other party, which could hinder continuous improvement</p> <p>B19 – Long-term relationships have negative consequences, such as rising expectations, subjectivity, and opportunism, which can negate the positive effects of a partnership; An ever-closer relationship can lead to self-interest and opportunistic behavior</p> <p>B20 – The level of formality influences the nature of the relationship between companies; Some firms feel immobilized and seek, especially in cases of a divergent logic, to develop relationships with alternative suppliers, who could compete for tasks</p> <p>B22 – Unilateral decisions about financial benefits can cause opportunism that may discourage a player from staying in the partnership</p> <p>B23 – One party tries to be the only profiting from the partnership</p>	7

Table 5.

the differences between firms disturb the process of joint creation of value, they can foster innovation in B2B relations, through the diversity of the pool of resources and knowledge available (Filieri *et al.*, 2014).

Regarding the inhibitor “actors’ inexperience in the context of value co-creation,” Enquist *et al.* (2015) argue that actors, who have experience with value co-creation have in-depth knowledge of the business logic of value creation process. So, managers’ limited expertise in value co-creation in the B2B context (Franklin and Marshall, 2019) might be due to the lack of

value creation studies that approach B2B relations (Stanworth, 2012), contractual complexities (Ali-Marttila *et al.*, 2017), competences and skills demanded in industrial services and information management (Gjerald and Lyngstad, 2015). Thus, when experienced actors co-create value with inexperienced actors, therein lies the problem of asymmetrical knowledge that jeopardizes the value co-creation process (de Faria *et al.*, 2010).

In response to the inexperience in this context, we might consider the cultural-cognitive aspect that, according to Tierney Kieran *et al.* (2016), it is the knowledge built on previous experiences, but adapted in new contexts, which leverages proficiency in transactions and interactions between actors that, consistent with the authors, makes it possible to reframe a context of skepticism and distrust into convenience and security. In this sense, Siahtiri (2017) states that storing knowledge from past experiences can be difficult, however, each actor should promote this knowledge transference within their work environment in a personal way, whether through practical work, development workshops or individual interaction. Therefore, no prior knowledge should be wasted to grow in experience. Also, investing in B2B relations knowledge, competences and skills is essential for those who crave the benefits of co-creating value in industrial services.

Concerning the “lack of measurement of value co-creation,” Enz and Lambert (2012) point out that the absence of measures makes it difficult to stipulate the financial returns from co-creation and to perceive its actual benefit; thereby demotivating firms to co-create.

Drawing upon the above mentioned, and thus, taking into consideration the importance of indicators for value co-creation, arise the question: Why is there a lack of value co-creation measures?

According to Enz and Lambert (2012), the answer to the above question is that co-created value is a multidimensional construct; thus, its perception differs from company to company, so it is challenging to specify and standardize value co-creation indicators. In the view of Stanworth (2012), the lack of value co-creation measures is due to the irrelevance of quality indicators in B2B services and the poor understanding of these relations (i.e. inexperience with value co-creation in B2B relationships). Thus, it can be said that the inhibitor “lack of measurement of value co-creation” is related to the inhibitor “actors’ inexperience in the context of value co-creation.” Also, the lack of standardization of data and the lack of accurate measures of productivity of value co-creation activities can be considered as factors hampering the measurement of value co-creation outcomes (Shamah, 2012; Saunila *et al.*, 2017). Consequently, the achievement of structures and patterns in interactions becomes a distinguishing feature in a context of diversity and interdependence (Russo-Spena *et al.*, 2017).

Finally, the inhibitor: “opportunism in sharing information” pertains to the risks, to which firms are exposed when they share their resources, information, and competencies with other companies in value co-creation (Filieri *et al.*, 2014). These risks let firms vulnerable (Todeva and Knoke, 2005) to the loss of intellectual property (Filieri *et al.*, 2014) and opportunistic behavior (Filieri *et al.*, 2014; Razmdoost and Mills, 2016; Braun *et al.*, 2017; Chou *et al.*, 2017). By behaving opportunistically, one partner takes advantage of his superior knowledge to make unilateral decisions (Braun *et al.*, 2017) and uses another partner’s resources to fulfill self-interests (Chou *et al.*, 2017). This type of behavior discourages firms from staying in a partnership, and, thus, interrupting the value co-creation process (Braun *et al.*, 2017).

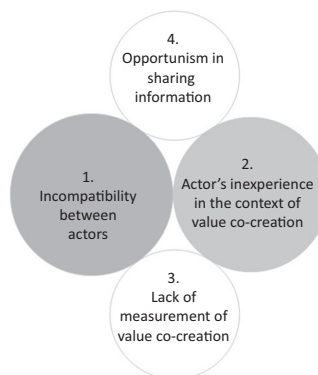
Still, concerning the opportunism in information sharing, we understand that the co-creation of value is a process that involves relationships with different characteristics that, therefore, needs to be governed by certain formalities that protect individual rights. However, Filieri *et al.* (2014) considers that the level of formality of companies, can influence the loss of intellectual property rights due to the opportunistic behavior that can occur between the parties. This condition demotivates one party and concentrates the value-added on the

other(s) party(ies), which could hinder continuous improvement, and generate risks for co-creation projects (da Silva *et al.*, 2015).

Figure 2 summarizes the four value co-creation inhibitors. The circle's size and color tone represent the frequency thereof (see Table 5).

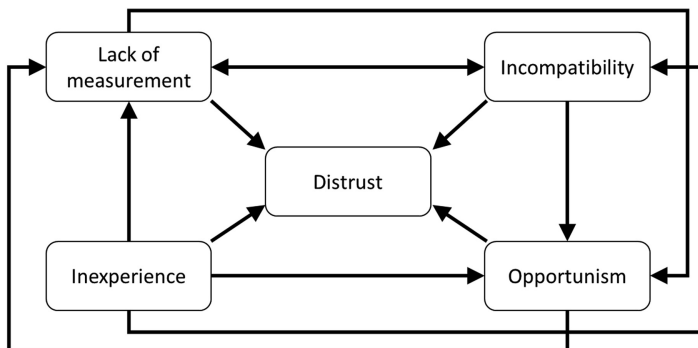
Based on the findings of the papers from Table 3, it is possible to infer that the current literature on value co-creation in industrial services has shown that the inhibitors have a direct or indirect connection to the lack of trust between the parties involved in co-creation. These connections show up in the risk of sharing confidential information (Todeva and Knoke, 2005; Schwetschke and Durugbo, 2018); the difficulty in observing the activity performance in case of people working remotely (Shamah, 2012); the conflict of loyalty (Lorgnier and Su, 2014); trust's influence on the firm's decision to joint take risks with their partners (Jarratt and Ceric, 2015); trust as criteria to establish a partnership (Vesalainen and Kohtamäki, 2015; Zhao *et al.*, 2017); the lack of trust due to the lack of actors's commitment to the contractual arrangement (Manser *et al.*, 2016; Ali-Marttila *et al.*, 2017); the distrust due to the wrong information sharing (Braun *et al.*, 2017).

Figure 3 shows how inhibitors relate to each other and the lack of trust.



Source(s): Authors

Figure 2.  
The inhibitors of value  
co-creation in  
industrial services



Source(s): Authors

Figure 3.  
The relations among  
inhibitors

## 5. Conclusion

This study aimed to recognize the facilitators and the inhibitors of value co-creation in industrial services and elucidate the value co-creation process. To meet this objective, we carried out the SLR and content analysis.

Based on our findings, value co-creation process in B2B context approaches at least two actors. The pre-requisite to this process to happen is the resource integration, which may be human, intellectual, financial or technological. However, what characterizes a co-creation beyond any integration or co-production is the mutual benefit towards every participating actor. Likewise, by the findings, it was possible to identify eleven facilitators and four inhibitors. The facilitators identified were: (1) involvement of actors; (2) synergy among Participants; (3) resource complementarity; (4) personal relationships between actors; (5) value compatibility; (6) specialized knowledge; (7) trust; (8) geographical proximity; (9) information exchange through technology; (10) the establishment of a network; (11) governance; and the inhibitors recognized were: (1) incompatibility between actors; (2) actors' inexperience in the context of value co-creation; (3) lack of measurement of value co-creation; (4) opportunism in sharing information.

### 5.1 Theoretical contributions

According to [MacInnis \(2011\)](#) literature reviews and discussions involves summarizing what is already known. In this regard, our SLR has theoretical implications, as it leads to the summarization of the facilitators and inhibitors of value co-creation in industrial services (see [Figures 1 and 2](#)). Consequently, [Ferenhof and Fernandes \(2016\)](#) state that new knowledge is generated based on previous results extracted from the synthesis of the data obtained. Since the literature review is the basis for identifying current scientific knowledge, the known serves as the basis for establishing the unknown. In this way, raising gaps in existing knowledge creates cycles of new knowledge that become more efficient as knowledge on the subject increases. For instance, the inhibitor "lack of measurement of value co-creation" opens up opportunities for future research. Hence, this work expands the knowledge threshold about the co-creation of value effects in industrial services.

Another theoretical contribution of this study derives from the combination of the SLR with the content analysis. By performing both stages, we do not only identify the facilitators and inhibitors, but we also categorized them, explained the context in which they are inserted, and demonstrated how these elements are distributed in the literature. More specifically, we showed the frequency of citation of each facilitator, and each inhibitor in the documents analyzed. Therefore, our study contributes to a more broad and condensed view of the facilitators and inhibitors of value co-creation in the field of industrial services.

Furthermore, as reported by [Chowdhury et al. \(2016\)](#), existing research has almost only focused on the bright side of value co-creation. That is to say, to a better understanding of the process of joint creation of value, there is a demand in the literature for studies approaching elements that have a negative influence over this process ([Heidenreich et al., 2015](#); [Chowdhury et al., 2016](#)).

Our study fulfills this demand with two main contributions: First, by presenting the inhibitors, we pointed out directly which are the obstacles that hinder value co-creation in industrial services. Second, in the discussion section, we showed that even some facilitators have a dark side. More specifically: high-level trusted relationships lead to relational inertia; high levels of complementarity and specialized knowledge cause asymmetries; too much control limits actors' contributions; too much geographical proximity hampers innovation. Therefore, our paper contributes to a thorough understanding of value co-creation, as it addresses direct (i.e. inhibitors) and indirect (i.e. the dark side of some facilitators) factors negatively impacting collaborative relationships as suggested by [Schwetschke and](#)



Durugbo (2018) when they expose the need for research aimed at the identification of obstacles and how they can be avoided or managed to co-create value in B2B relationships.

Finally, this study also addresses the varied range of supplier offerings that go from elementary aftermarket services to complex solutions that associate goods and services (Kowalkowski *et al.*, 2011) that create value for the client in B2B relationships (Kowalkowski, 2006; Priya Datta and Roy, 2011) so that different activities such as training, engineering, predictive maintenance, advanced process diagnostics, and fleet management (Gitzel *et al.*, 2016) come into this context. Thus, both the approach of specific areas in different articles and the general approach in others allows the generalization of facilitators and inhibitors of the co-creation of value in the context of industrial services.

### 5.2 Practical implications

In the discussion section, we showed that the most frequent facilitators, “Involvement of actors” and “Synergy among participants,” depend upon customer’s willingness to exchange their resources. In this regard, our findings demonstrate that managers need to orient the organizational culture towards customers in order to maximize value co-creation performance.

Customer-oriented firms have a close relationship with their buyers and are more likely to satisfy them efficiently (Narver and Slater, 1990; Deshpandé and Farley, 1998). By feeling satisfied, customers have a good impression of their suppliers, and thus, are more willing to share their resources with them (Wang *et al.*, 2013). These resources from customers reduce the cost of service provision (Siahtiri, 2017) and accelerate the process of solving problems (Aarikka-Stenroos and Jaakkola, 2012), thereby enhancing value co-creation performance.

Furthermore, our study reveals that Knowledge Management (KM) is essential for a successful value co-creation. Pursuant to the concept of “resourceness,” the potential of resources depends on the knowledge and skills from actors (e.g. customers) (Lusch and Vargo, 2014; Koskela-Huotari and Vargo Stephen, 2016). In this sense, managers from customer firms must know their employees’ capacity for using or learning a resource shared by their suppliers. Because, when a customer fails to accomplish one of these tasks, they either leave the supplier’s resources unused or replaces them with others (Komulainen, 2014). This has two interrelated negative consequences for the value co-creation performance: First, waste on supplier’s resources. Second, value co-creation failure. Therefore, to take advantage of the facilitators “Resource complementary” and “Specialized Knowledge,” managers need to employ KM in the process of joint creation of value.

In addition, managers’ limited experience with value co-creation is due to the lack of value creation studies that approach B2B relations (Stanworth, 2012). Therefore, by addressing the co-creation of value in the B2B context, this study suggests, in agreement with Enquist *et al.* (2015), that the actors should work with the co-creation of value when carrying out the integration of resources and co-production instead of working with the co-creation in parallel to the relationships between the actors, afraid of avoiding losses. If there is poor knowledge about the context, the cognitive aspect must stand out along with the ability of administrators to manage risk, once this paper brings the risks of each facilitator and inhibitor of value co-creation.

### 5.3 Limitations and future research

As would be expected, this research is subject to some limitations. So, even though the SLR covered a large proportion of the studies available, this research may not have enabled a complete coverage of all existing peer-reviewed papers in the field of value co-creation in industrial services.

Nonetheless, recognizing the facilitators and inhibitors of the process of joint creation of value in industrial services is only the first step towards a thorough understanding of this

process. That is to say; more research is needed in the field of value co-creation in industrial services. So, some suggestions for future research are proposed here.

First, future research could empirically verify whether the facilitators and inhibitors identified by this study are present in practice and/or whether other facilitators and inhibitors emerge. Also, this same research should answer whether the facilitators outweigh the inhibitors of value co-creation. A second study should address the gap in value co-creation literature, highlighted by the inhibitor “lack of value co-creation measurement,” because although Tommasetti *et al.* (2017) outline a conceptual model for co-creating value from an SDL perspective, their approach is B2C. Therefore, we suggest future research or for a suitable B2B fit to the models proposed in B2C or research that should aim to recognize and/or propose metrics for measuring value co-creation regardless of B2C relationships. Finally, another research should investigate the impact of industry 4.0, especially of the IoT, on value co-creation management.

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