



## RECOGNITION OF WASTES FROM VALUE CO-CREATION IN INDUSTRIAL SERVICES IN STARTUPS

*IDENTIFICAÇÃO DOS DESPÉRDÍCIOS DE COCRIAÇÃO DE VALOR EM SERVIÇOS INDUSTRIAIS EM STARTUPS*

*RECONOCIMIENTO DE DESPÉRDICIOS DE LA CO-CREACIÓN DE VALOR EN SERVICIOS INDUSTRIALES EN STARTUPS*

 **Andrei Bonamigo**<sup>1</sup>  
 **Matheus Antunes Goulart Barbosa**<sup>2</sup>  
 **Steffan Macali Werner**<sup>3</sup>  
 **Herlandi de Souza Andrade**<sup>4</sup>

Cite as – American Psychological Association (APA)

Bonamigo, A., Barbosa, M. A. G., Werner, S. M., & Andrade, H. de S. (2022, July). Recognition of wastes from value co-creation in industrial services in startups. *International Journal of Innovation - IJI*, São Paulo, 10(Special issue), 461-482. <https://doi.org/10.5585/iji.v10i3.21130>.

### Abstract

**Objective of the study:** This study aims to identify the wastes from the value co-creation in industrial services in the startups context. In addition, through the dynamic systems approach, to analyze the interaction among the wastes in the startups' value co-creation.

**Design/methodology/approach:** First, we conducted a systematic literature review based on the Systematic Search Flow method (SSF) and the content analysis following Bardin (2011), then, through the dynamic systems approach, this step, we verify the interaction and behavior among these wastes in the value co-creation context.

**Findings:** Based on the finds, we recognized six wastes from the value co-creation in startups. We evidenced that waste "Personal Characteristics" was pointed was the greatest impact on co-creation concerning other wastes.

**Originality:** This is the first paper that recognizes and behavior evaluates the wastes from value cocreation in industrial service based on the dynamic of systems approach for the startups.

Research limitations/implications: The wastes recognized were based on current literature. An empirical test can be a way to identify other wastes and evaluation these finds in the practice.

**Practical implications:** The listed wastes can serve as a basis to guide strategies for mitigating or eliminating these losses in the value co-creation process in startups. In addition, directing players in decision-making anticipated way from different perspectives to improve collaboration among multiple companies without wastes.

**Social implications:** Once the value cocreation process is more efficient, the societal can receive more benefits and enhance well-being, through services new or services improved offerings for society via startups.

**Keywords:** Value co-creation barriers. Industrial services. Wastes in industrial services. Performance improvement.

<sup>1</sup>Doctor's Degree, Fluminense Federal University – UFF. Volta Redonda - RJ – Brazil. [andreibonamigo@gmail.com](mailto:andreibonamigo@gmail.com)

<sup>2</sup>Undergraduate Degree, Fluminense Federal University – UFF. Volta Redonda - RJ – Brazil. [matheusgoulart@id.uff.br](mailto:matheusgoulart@id.uff.br)

<sup>3</sup>Doctor's Degree, Federal University of Santa Catarina – UFSC. Florianópolis – SC – Brazil. [steffan\\_m\\_w@yahoo.com.br](mailto:steffan_m_w@yahoo.com.br)

<sup>4</sup>Doctor's Degree, University of São Paulo – USP. Lorena - SP – Brazil. [herlandi@usp.br](mailto:herlandi@usp.br)

## Resumo

**Objetivo:** Este estudo tem como objetivo identificar os desperdícios da cocriação de valor em serviços industriais no contexto de startups. Além disso, através da abordagem de sistemas dinâmicos, analisar a interação entre os desperdícios na cocriação de valor das startups.

**Desenho/metodologia/abordagem:** Inicialmente, realizamos uma revisão sistemática da literatura com base no método Systematic Search Flow (SSF) e a análise de conteúdo seguindo Bardin (2011), em seguida, através da abordagem de sistemas dinâmicos, nesta etapa, verificamos a interação e comportamento desses resíduos no contexto da cocriação de valor.

**Resultados:** Com base nos achados, reconhecemos seis desperdícios da cocriação de valor em startups. Constatamos que o resíduo “Características Pessoais” foi apontado como o de maior impacto na cocriação em relação aos demais resíduos.

**Originalidade:** Este é o primeiro trabalho que reconhece e avalia o comportamento dos desperdícios da cocriação de valor em serviços industriais com base na abordagem dinâmica de sistemas para as startups. Limitações/implicações da pesquisa: Os resíduos reconhecidos foram baseados na literatura atual. Um teste empírico pode ser uma forma de identificar outros desperdícios e avaliar esses achados na prática.

**Implicações práticas:** Os desperdícios listados podem servir de base para orientar estratégias de mitigação ou eliminação dessas perdas no processo de cocriação de valor em startups. Além disso, direcionar os atores na tomada de decisões antecipada de diferentes perspectivas para melhorar a colaboração entre várias empresas sem desperdícios.

**Implicações sociais:** Uma vez que o processo de cocriação de valor seja mais eficiente, a sociedade pode receber mais benefícios e aumentar o seu bem-estar, por meio de novos serviços ou ofertas de serviços aprimorados para a sociedade via startups.

**Palavras-chave:** Barreiras da cocriação de valor. Serviços industriais. Desperdícios em serviços industriais. Melhoria de desempenho.

## Resumen

**Objetivo:** Este estudio tiene como objetivo identificar los desperdicios de la co-creación de valor en los servicios industriales en el contexto de las startups. Además, a través del enfoque de sistemas dinámicos, analizar la interacción entre los residuos en la co-creación de valor de las startups.

**Diseño/metodología/enfoque:** Primero, realizamos una revisión sistemática de la literatura basada en el método Systematic Search Flow (SSF) y el análisis de contenido siguiendo a Bardin (2011), luego, a través del enfoque de sistemas dinámicos, este paso, verificamos la interacción y comportamiento entre estos residuos en el contexto de co-creación de valor.

**Hallazgos:** Con base en los hallazgos, reconocimos seis desperdicios de la co-creación de valor en las startups. Evidenciamos que el residuo "Características Personales" fue señalado como el de mayor impacto en la co-creación con respecto a otros residuos.

**Originalidad:** Este es el primer trabajo que reconoce y evalúa el comportamiento de los desperdicios de la cocreación de valor en el servicio industrial basado en el enfoque dinámico de sistemas para las startups.

**Limitaciones/implicaciones de la investigación:** Los desechos reconocidos se basaron en la literatura actual. Una prueba empírica puede ser una forma de identificar otros residuos y evaluar estos hallazgos en la práctica.

**Implicaciones prácticas:** Los desperdicios enumerados pueden servir de base para orientar estrategias de mitigación o eliminación de estas pérdidas en el proceso de co-creación de valor en las startups. Además, dirigir a los actores en la toma de decisiones de manera anticipada desde diferentes perspectivas para mejorar la colaboración entre múltiples empresas sin desperdicios.

**Implicaciones sociales:** Una vez que el proceso de cocreación de valor es más eficiente, la sociedad puede recibir más beneficios y mejorar el bienestar, a través de servicios nuevos o servicios mejorados que se ofrecen a la sociedad a través de nuevas empresas.

**Palabras clave:** Barreras a la creación conjunta de valor. Servicios industriales. Residuos en servicios industriales. Mejora del rendimiento.

## 1 Introduction

The value co-creation in industrial service has facilitated cooperation among enterprises, increased the economic gains of organizations, and, improve the competitive differential creation in a way cooperative. Thus, allow startups to join in structured markets. However, the wastes of value co-creation in startups are superficially explored areas by literature. Chowdhury (2016) states that there is a dark side to value co-creation that is not addressed in research, in this sense Bonamigo and Frech (2020) as well as Waseem et al., (2020) present inhibitors and challenges to value co-creation but do not address wastes on the value co-creation process. Thus, this study aims to fill this gap, recognizing within the context of startups, the value co-creation wastes. In this sense, Andrade et al., (2017) and Andrade et al., (2016) consider out that the interaction process, specifically for open innovation processes, which applies to value co-creation, are complex as they occur with players with different methodologies, times, concerns, and goals. In addition, for these authors, players also suffer from bureaucratic processes that increase the lead time of the operation. It is necessary to create strategies to combat these wastes and encourage cooperation among them.

Thus, once recognize the wastes in this context, the emphasis concentrates in demonstrate the positive aspects of the value co-creation among players that generate value in relation B2B (Business to Business), this way transposing the disadvantages, the risks, and the fragilities linked to the relationship among the enterprises and stimulate the advantages this interaction (Heidenreich et al. 2015).

This way, it is emphasized that value co-creation in startups may not always produce desirable results, for example, actors may enter into conflicts and/or partners may present opportunistic behavior, difficulties in managing intellectual property, which negatively impacts the value co-creation process, reducing the performance, and business competitive advantages (Abosag et al 2016, Chowdhury et al 2016; Andrade et al., 2016; Andrade et al., 2017).

In this context, the wastes from co-creation in startups are related to information flow inefficiently (Nätti et al. 2014, Rexfelt et al. 2011, Singh Panesar & Markeset 2008; Krishna et al., 2016). For Nätti et al (2014), the value co-creation generates the need for approval from several actors so that the process can follow the flow, a fact also cited by Rexfelt et al (2011), who reports that for simple problem solving the exchange of information and approvals among players is slow, generating inefficiency.

As for Singh Panesar, Markeset (2008), Krishna et al., (2016), it is necessary that monitoring points are created so that all co-creation players are aware of what is happening in the process. Furthermore, they also mention that co-creation tends to create a linear process, while activities that could start together are carried out sequentially in order to reduce the loss of information. the advantages perception lack' of cooperation among the authors involved (Virtanen et al. 2015) and long lead time for obtaining the benefits from cooperation (Jaakkola & Aarikka-Stenroos, 2018). Based on the exposure, this study aims to identify the wastes from the value co-creation in industrial services in a startups

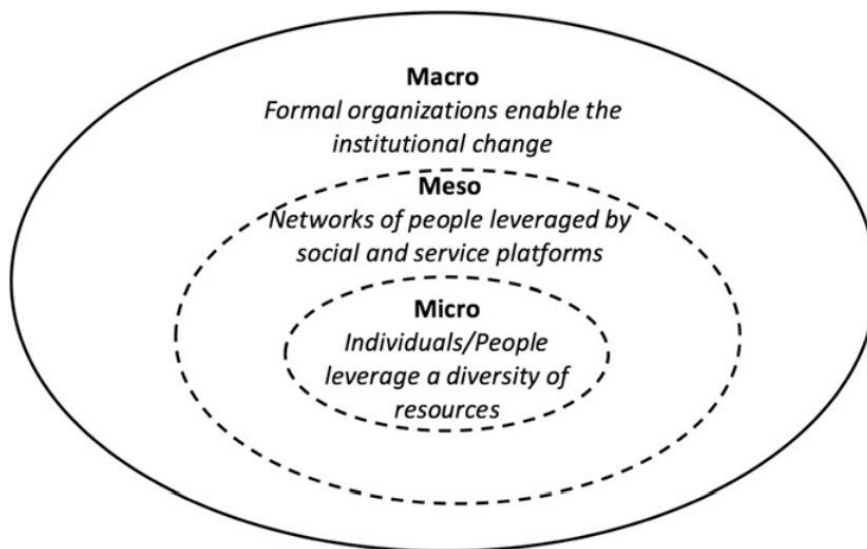
context. In addition, through the dynamic systems approach, analyze the interaction among the wastes in the context of value co-creation in the industrial service environment.

## 2 The industrial service ecosystem

In an industrial service context, the ecosystem refers to interdependent between individuals and organizations that share your resources for a guarantee of your survival in business environments that operate (Jaakkola & Hakanen 2013, Frow et al. 2014, Lusch et al. 2016). This way, the players (individual, people network, and the organizations) integrate your resources and service exchange in three levels in this ecosystem, they are Macro, Meso and Micro (Figure 1) (Koskela-Huotari et al. 2016, Letaifa et al. 2016).

**Figure 1**

*Ecosystem levels in industrial service*



**Source:** Adapted from Letaifa et al. (2016).

Thus, the industrial service ecosystem is service system with dynamic characteristics, where available resources (people, technologies, and information) stimulate the value co-creation (Maglio & Spohrer 2008). In this sense, the players are drivers for co-creation value with other players to obtain resources that they lack and/or that are necessary for their survival in the market, through resources complement (Frow et al. 2014).

In this sense, the study of the ecosystem in industrial service dedicates the value co-creation investigation in industrial service, that is, the research in the value co-creation in the B2B context, where enterprises share resources with others for obtaining mutual benefits (Vargo & Akaka 2012).

### *2.1 Value co-creation in industrial services*

According to Vargo & Lusch (2008), value co-creation in industrial services consists of a method for increasing the value for clients and services enterprises. In this way, Bolton & Saxena-Iyer (2009) character the value co-creation by actuation together among suppliers and/or clients in improvement projects related to products or services.

In this way, value co-creation processes can take different forms, characterized by different levels of participation that depend on the roles, responsibilities, and players' various involvement (Wolfson, 2016).

Thus, co-creation is the union of the creation and development of value with stakeholders in particular, which is intensified and promulgated through engagement platforms, virtualized and emerging from resource ecosystems, and updated and incorporated in domains of experiences, expanding wealth, health, and well-being in business (Ramaswamy & Ozcan 2014). In other words, co-creation can occur only through direct interactions, however, these interactions are not an automatic shortcut to gain access to the creation of value for the customer; instead, they form a platform for joint value co-creation (Grönroos & Voima 2013).

This interaction allows developing systems, products, or services through collaboration with customers, managers, employees, and other stakeholders extern the company (Ramaswamy 2011), who share their resources in the business environment to obtain mutual benefits (Vargo & Akaka 2012).

The co-creation of value in industrial services is related to products and service processes, so that companies co-create value with their partners, intending to improve the performance of their services, reduce operating costs and innovate through creating new services (Oertzen et al. 2018).

However, despite all the benefits mentioned, when the value co-creation is inefficient, it can negatively impact the business or the partners in a way that harms the cooperation sustainability, that is, the opposite effect of the desired (value destruction) (Oertzen et al. 2018).

### *2.2 Value co-creation in startups*

Startups are enterprises that do not have a business model consolidated, they are flexible and seek scalable means of growth (Blank, 2013; Ghezzi & Cavallo, 2020; Ghezzi, 2020). One of these ways to leverage this growth would be the co-creation of value with companies already consolidated (Pullen et al, 2009).

Improving the understanding of the role of co-creation of value by players already consolidated in the market and startups is essential to enable a relationship of mutual benefit and to avoid contractual and relational orders, thus avoiding the value destruction (Fierro and Pérez, 2018).

An enterprise working alone is not the better strategy, once the knowledge and experiences are limited within among your workers (Pullen et al., 2009). Thus, is necessary to collaborate in a broader ecosystem (Zott & Amit, 2008; Cavallo et al., 2019). For startups, this is fundamental, since the

business-to-business relationship allows prospecting for new customers and new ventures through the resource's complementarity (Ghezzi et al, 2020).

In this sense, co-creation in startups generates positive effects linked to the increase in the level of process innovation, since when resources are scarce, innovating becomes a difficult task (OCDE, 2018). However, despite this mutual benefit, there is a difficulty for a traditional company to see how value co-creation with Startups can be established as a win-win relationship among them and not a form of intellectual appropriation or use by younger companies (Ghezzi et al, 2020).

### 2.3 Production waste

Wastes are activities that do not create value for the customer, but that consume the resources of the companies (Womack & Jones 2003). Taichi Ohno, Toyota executive identified and classified waste into seven categories, namely: overproduction, inventory, motion, defects, over-processing, waiting, and transport (Womack and Jones 2003).

However, an eighth waste, called underutilized people, was later added to Taichi Ohno's original list (Wahab et al. 2013). This waste brings together the individual's intellectual property loss, as well as the inadequate arrangement of the workforce, which results from more people involved than is necessary to perform a certain task (Wahab et al. 2013, D'antonio & Chiabert 2018).

## 3 Methodological procedures

This study aims to identify the wastes from the value co-creation in industrial services in a startups context. In addition, through the dynamic systems approach, analyze the interaction among the wastes in the context of value co-creation in the industrial service environment. To achieve this objective, three steps were followed. In the first stage, a Systematic Literature Review (RBS) was conducted to recognize the art state linked to the wastes of value co-creation in industrial services. This step was conducted using the Systematic Search Flow method (SSF) (Ferenhof & Fernandes 2016).

The systematic review followed six phases that were proposed by Jesson et al. (2011) and Ferenhof & Fernandes (2016). They are:

- 1) Field mapping, through a scoping review;
- 2) Exhaustive research;
- 3) Quality assessment, which includes reading and selecting works;
- 4) Data extraction, which refers to the collection and capture of relevant data in a pre-designed spreadsheet;
- 5) Synthesis, which comprises the extracted data synthesis to show what is known and provides the basis for establishing the unknown; and
- 6) Write.

Firstly, the search was performed using strings with the search term "startup" OR "start up" OR "start-up", but it didn't return results. In this way, after the strings calibration, we use the following search strings: ((“industrial service” OR “service industry” OR “service industries”) AND (“co-creation” OR “co-production” OR cocreation)). Data collection was performed in the second trimester of 2021.

In addition, academic papers were reviewed by peers in English, from the databases of Ebsco, Compendex, Emerald, Web of Science, Science Direct, Scopus, Books. Non-academic researches were excluded.

Based on the portfolio resulting from the literature mapping, we carried out the work second stage, which included content analysis, according to Bardin (2011). In this step, the documents were coded and analyzed according to the context criteria. The units of analysis were defined posteriori.

For this stage, the inclusion and exclusion criteria were defined based on the question: Does the work present any waste for the value co-creation in the B2B relationship or in startups? At this stage, papers that demonstrate a relationship between B2C (Business to Consumer) were removed since they are not adherent to the research scope. Additionally, the works were read individually by the authors and the findings between them were agreed upon in a second moment.

Based on the works portfolio obtained in the second stage, the units of analysis and context were defined. In this stage, we listed the value co-creation wastes in industrial service.

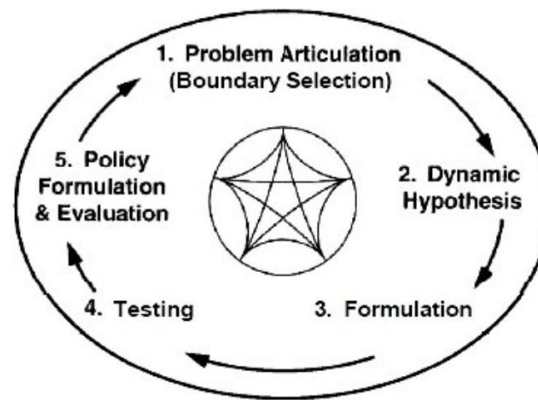
Then, through the systems dynamic's analysis, we conducted the verification of the interaction among the waste in the co-creation value context. The system dynamic uses the holistic view to analyze the variables that interact with each other and their influences on the system, depending on the feedback of the system by changing the variables. Thus, an updated or generated variable as a result of the system can be used as input to generate new results in this system (Sterman, 2000).

In this context, system dynamics seeks to represent the relationship between the key variables identified, simulating the system's behavior over time. The results from the system's dynamics can be used as an aid for decision-making oriented to improvement or even, for a better understanding of complex systems (Rashwan; Abo-Hamad & Arisha, 2015).

For the Systems Dynamics model elaboration, the steps proposed by Sterman (2000), were followed, as shown in Figure 2.

**Figure 2**

*Steps for the elaboration of a system dynamics model*



**Source:** Adapted from Sterman (2000).

According to Sterman (2000), the five steps are Identification and the problem definition, in which the problem is defined, as well as the identification of key variables and the time horizon that the model considers; The causal link diagram formulation, describing which are the initial system current behavior theories, aiming to elaborate on the model's feedback structure. In step the model construction the decision rules are added and the initial parameters of the system are estimated, as well as the model consistency tests.

Already the experiment analysis, this step seeks to compare the reference model with reality, in addition to verifying whether the generated model meets the proposed needs. Subsequently, the policies formulation and assessments are conducted, consisting of policy tests and testing of the "What if ..." hypotheses, to analyze the possible scenarios generated.

#### 4 Results and discussions

From the RBS, 1288 articles were found, as shown in Table 1.

**Table 1**

*Resulting bibliographic portfolio*

Database	Number found documents
Science Direct	584
Emerald	473
Scopus	78
Compendex	63
Web of Science	59
Ebesco	31
Total	<b>1288</b>
Duplicates	<b>-78</b>
Total RBS result	<b>1210</b>

**Source:** The authors.



Based on the resulting portfolio, 78 duplicate works were found, after excluding them, an amount of 1210 works was obtained for analysis. Based on the documents resulting from the search, at first, the titles, keywords, and the respective abstracts of documents were analyzed to certify that they showed a relationship with the search scope. After the completion of this step, 204 documents were added, for the reading of the introduction and conclusion of documents. For the next step, 54 documents were reading completely. Once the documents had been read in full and the authors' findings were consensus, a total of 24 documents resulted, as shown in Table 2.

**Table 2**

*Portfolio of works resulting from RBS*

Code	Author	Year	Title	Journal/Source
A1	Aaldering, Leker & Song	2018	Analyzing the impact of industry sectors on the composition of business ecosystem: A combined approach using ARM and DEMATEL	Expert Systems with Applications
A2	Aarikka-Stenroos & Jaakkola	2012	Value co-creation in knowledge-intensive business services: A dyadic perspective on the joint problem-solving process	Industrial Marketing Management
A3	Agarwal & Selen	2011	Multi-dimensional nature of service innovation: Operationalisation of the elevated service offerings construct in collaborative service organizations	International Journal of Operations & Production Management
A4	Ali-Marttila, et al.	2017	Understand what your maintenance service partners value	Journal of Quality in Maintenance Engineering
A5	Barravecchia, Franceschini & Mastrogiacomo	2018	A service network perspective to evaluate service matching in early design	Journal of Service Theory and Practice
A6	Biggemann, Kowalkowski, Maley & Brege	2013	Development and implementation of customer solutions: A study of process dynamics and market shaping	Industrial Marketing Management
A7	Braun, ereira, Sellitto & Borchardt	2017	Value co-creation in maintenance services: case study in the mechanical industry	Business Process Management Journal
A8	Breidbach & Maglio	2016	Technology-enabled value co-creation: An empirical analysis of actors, resources, and practices	Industrial Marketing Management
A9	Carbonell & Rodriguez-Escudero	2014	Antecedents and consequences of using information from customers involved in new service development	Journal of Business & Industrial Marketing
A10	Chowdhury, Gruber & Zolkiewski	2016	Every cloud has a silver lining — Exploring the dark side of value co-creation in B2B service networks	Industrial Marketing Management

Code	Author	Year	Title	Journal/Source
A11	Dadfar, Brege & Sarah Ebadzadeh Semnani	2013	Customer involvement in service production, delivery and quality: the challenges and opportunities	International Journal of Quality and Service Sciences
A12	Graça & Camarinha-Matos	2017	Performance indicators for collaborative business ecosystems — Literature review and trends	Technological Forecasting and Social Change
A13	Hsieh, Lee & Ho	2012	Strategy and process of value creation and appropriation in service clusters	Technovation
A14	Jaakkola & Hakanen (2013)	2013	Value co-creation in solution networks	Industrial Marketing Management
A15	Janeschek, Hottum, Kicherer & Bienzeisler	2013	The dynamics of service productivity and value creation: a service life cycle perspective	Service Industries Journal
A16	Komulainen	2014	The role of learning in value co-creation in new technological B2B services	Journal of Business & Industrial Marketing
A17	Murthy, Padhi, Gupta & Kapil	2011	An empirical investigation of the antecedents of value co-creation in B2B IT services outsourcing	Journal of Interactive Marketing
A18	Nätti, Pekkarinen, Hartikka & Holappa	2014	The intermediary role in value co-creation within a triadic business service relationship	Industrial Marketing Management
A19	Rexfelt, Almefelt, Zackrisson, Hallman, Malmqvist & Karlsson	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
A20	Schwetschke & Durugbo	2018	How firms synergize: Understanding motives and management of co-creation for business-to-business services	International Journal of Technology Management
A21	Singh Panesar & Markeset	2008	Development of a framework for industrial service innovation management and coordination	Journal of Quality in Maintenance Engineering
A22	Steinbach, Wallenburg & Selviaridis	2018	Me, myself and I: Non-collaborative customer behavior in service outsourcing – the key role of outcome orientation and outcome attributability	International Journal of Operations & Production Management
A23	Tsou, Cheng & Hsu	2015	Selecting a business partner for service delivery co-innovation and competitive advantage	Management Decision
A24	West, Gaiardelli, Resta & Kujawski	2018	Co-creation of value in Product-Service Systems through transforming data into knowledge	IFAC-PapersOnLine

Source: The authors.

#### 4.1 Content analysis

From the analysis of the documents presented in Table 2, it was possible to identify the context units from the 6 analysis units defined for waste, as shown in Table 3.

**Table 3**

#### Waste in Value Co-Creation

Analysis Unit	Context Unit	Frequency
<b>Time</b>	A1 - Companies seek to compete only for costs and ignore the value delivered for acquiring the know-how and the third parties' resources received.	11
	A3 - Service delivery lead times, enhanced on-time delivery of services, and a reduction in the customer waiting time.	
	A8 - An intermediary is needed to filter the information during the co-creating value process, so that time is spent on activities that do not add co-creation.	
	A14 - The Research and Development sector does not receive enough inputs and information to develop its activity.	
	A14 - Subcontracts in which an actor can only start his activities when the other ends.	
	A18 - Activities need evaluation and approval from different actors in the system.	
	A19 - Slow information flow to solve simple problems.	
	A21 - Activities that could start together are carried out in sequential steps.	
	A6 - There is a need for motivation on the actors one part so that the co-creating value process proceeds to the next step.	
<b>Confidence lack</b>	A23 - Need for a high number of reports and increased waiting time due to the confidence lack.	7
	A24 - Data is not easily shared between the network as it has commercial value, and this creates discomfort for the companies involved, requiring time to obtain information for decision making.	
	A7 - An actor seeks to unduly benefit from the other so that the partnership is broken.	
	A10 - Opportunism creates a breakdown of partnerships and the motivation for co-creating value is ended (value destruction).	
	A13 - It is necessary to create patents to protect one actor from another within the co-creating value process.	
	A18 - Activities need evaluation and approval from different actors in the system.	
	A22 - Inadequately written contracts create ambiguity so that the partnership can generate losses to one of the parties.	
<b>Unnecessary activities</b>	A23 - Need for a high report number and increased waiting time due to the confidence lack.	6
	A24 - Data is not easily shared between the network as it has commercial value, and this creates discomfort for the companies involved, requiring time to get information for decision making.	
	A9 - Customer feedback is sometimes not used in the value co-creation process.	
	A11 - Rework generated by a lack of communication effective among the customer and the service provider.	
	A12 - There is a need to develop indicators for measuring co-creation results in order to indicate the collaboration benefits.	
	A15 - Unnecessary processes are created to search for information among the actors.	
A17 - A high co-creation level is not always necessary to achieve good results.		
A21 - Due to the service's intangibility, several monitoring and evaluation points are necessary.		

Analysis Unit	Context Unit	Frequency
<b>Inappropriate partnership</b>	A4 - Inadequately chosen partners create problems in the co-creating value process.	5
	A5- The service network design falls into is a problem for the service relationship classification.	
	A22 - Inappropriately written contracts create ambiguity; the partnership can generate losses for one of the parties.	
	A23 - The partner for co-creating value is not well chosen and this causes a lack of trust between the parties.	
<b>Personal characteristics</b>	A2 - Super professionals are arrogant during the co-creating value process and the client does not want to accept the expert's suggestion.	3
	A10 - The actors do not have well-defined roles or the roles are ambiguous during the co-creating value process; this way, unnecessary tasks are performed.	
	A19 - You can have a "Knowledge Keeper".	
<b>Lack of customer value perception</b>	A14 - Difficulty making the final customer pay for the value co-creation process.	3
	A16 - Customer learning is often not considered in the co-creating value process.	
	A19 - A high degree of value co-creation requires a long time. That makes it possible for another company to innovate faster and "steal your customer"	

Source: The authors.

About the waste "Time", this comprises the idle time that does not add value in an environment of value co-creation. It is noteworthy that the waste of time is more comprehensive than the waste "Waits" introduced by Taiichi Ohno. Since "Waiting" is the waste that occurs in the idle times of operators, products, or information, at intervals at which no processing, transportation, or inspection is performed (Ohno 1997). However, this study also considered transportation, processing, and inspection times that do not add value to the final product/service, which contributes to unnecessary prolongation for final delivery.

For Breidbach & Maglio (2016), the need for an intermediary to filter the quality of the information in the value co-creation context is considered a time waste, that is, it is not adding value to the activity. In this context, Singh & Markeset (2008), raise the question that in value co-creation processes about activities that could start together, however, in practice, are carried out sequentially. This factor indicates a wasted time in the activity, that is, time wasted as mentioned above is characterized as an opportunity cost. This implies a lead time extension, which may also cause the end customer's purchase to be abandoned or the lost opportunity to enter a specific market (Agarwal & Selen, 2011).

Regarding the "confidence lack" waste, this is composed of all conflicts among the actors that negatively influence the information flow to carry out the value co-creation. These are related to the opportunistic attitudes for value co-creation (Braun et al. 2017, Chowdhury et al. 2016), the need to create patents (Hsieh, Lee and Ho, 2012), and the information exchange fear reported by Gaiardelli, Resta, & Kujawski, (2018). At co-creation in startups, this waste can be evidenced by the difficulty of big players in seeing this process as a win-win relationship and not just a form of intellectual appropriation (Ghezzi et al, 2020).

The waste "unnecessary activities" encompasses the entire process carried out by man or machine that does not add value to the final product/service (Ohno 1997). Therefore, some examples can be highlighted as "unnecessary activities": (a) the report approvals by several sectors to advance a certain value co-creating process (Nätti et al. 2014); (b) intermediaries uses for the flow of information (Breidbach 2016); (c) activities monitoring points creation (Markeset 2008).

Regarding the waste "inadequate partnerships", it is assumed that the partnership is a mutual relationship between companies in order to benefit everyone (Ali-Marttila et al. 2017). However, the wrong partners choice in the value co-creation context can be seen as a waste. Since an inappropriate partner generates distrust (Tsou et al. 2015); contractual disagreements (Steinbach et al. 2018); and/or the partners' choice for affinity (Schwetschke and Durugbo 2018).

Regarding the waste "Personal characteristics", Aarikka-Stenroos & Jaakkola (2012) point out that there may be "super professionals" who do not accept suggestions from other actors, even being arrogant in certain attitudes. In this way, this waste is directly related to the people who participate in the process of co-creating value in startups. In the value co-creation context, there may be the player "Guardian of knowledge", corresponding to the specialist who does not want to share his know-how so as not to lose his importance in the company (Rexfelt, et al. 2011).

Concerning the waste "Lack of customer value perception", it is highlighted that the value co-creation brings advantages and gains for the business, as well as for the actors that cooperate in startups (Bonamigo 2017, Moore 1996). On the other hand, Jaakkola & Hakanen (2013) point out that it is a challenge for the end customer to perceive value arising from cooperation since it is not clear from the end customer perspective this production process (Fernando and Las Casas 2018). A value co-creation process can demand a long lead time and the end customer can change suppliers to meet orders that demanded a shorter delivery time; thus, the startup context needs a fast and short cycle for each to deliver (Rexfelt et al. 2011).

Production constraints can also be allocated within the "time" waste. Constraints are any resource, machine, equipment, or work center that is overloaded in an industry or responsible for the slowest step in the production process, thus, production is limited to the capacity or the constraints speed (Goldratt and Cox, 2016). This view can be applied to value co-creation processes, given that further improvements in the co-creation process are carried out based on the slower activities and/or operations, i.e., the process constraints.

#### *4.2 The value co-creation behavior based on wastes*

In order to analyze the value co-creation behavior based on the wastes found in startups context, we apply the system dynamics concept. Initially, the flow to be analyzed was outlined. In this case, in the value co-creation, it is considered the information alteration/transformation over time to comply with

the organizations' needs involved. In this way, the variables used for the model elaboration, correspond to:

- Co-creation waste
- Initial information
- Final information
- Iterations between organizations
- Communication channel
- Transformation time

Then, for the elaboration of causal loops diagram, we sought to understand how the co-creation waste interrelates. This analysis consists of the theoretical verification among the wastes.

For this verification, we use the waste “Inadequate partnership” as a starting point for the comparison, since the co-creation process depends on at least two parties to work together (Oertzen et al. 2018). An inadequate choice partnership generates distrust among the actors (Tsou et al, 2015). The distrust means that the value co-creation process will need stricter contracts in the startup's context, with activities to monitor the actions, which is a direct relationship with the waste “Unnecessary activities”.

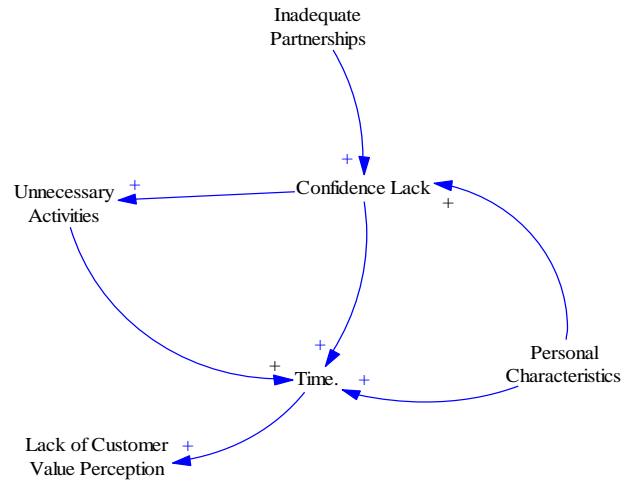
West et al. (2018), raise the question that the trust lack between the actors slows the information flow, thus being the cause for time waste. In this way, a direct relationship can be seen between waste "Trust" and "Time". On the other hand, addressing the analysis unit "Time", Panesar & Marqueset (2008) show that activities that could be carried out at the same time are carried out sequentially. This behavior is directly related to the “customer's optics” analysis unit, since Rexfelt et al. (2011) consider that for the end customer, the value co-creating process is too long, that is, the delay in co-creating value can generate a change in supplier.

This view can still be reinforced by the idea presented by Jaakkola & Hallin (2018) who say that the end customer does not pay for the value co-creating process. In this way, an increase in time is not only a problem because the customer can find another supplier, but it is also a problem because the customer does not see added value in this process.

There is also the question raised by Rexfelt et al. (2011), who talks about the “Knowledge Keeper” presence who is the actor who, out of distrust or fear, does not share information with the value co-creation team, this way, constraints are generated. Showing the relationships among “people”, “Time” and “Trust” waste. These relationships can be seen in Figure 3.

**Figure 3**

*Causal loop diagram for value co-creation waste*



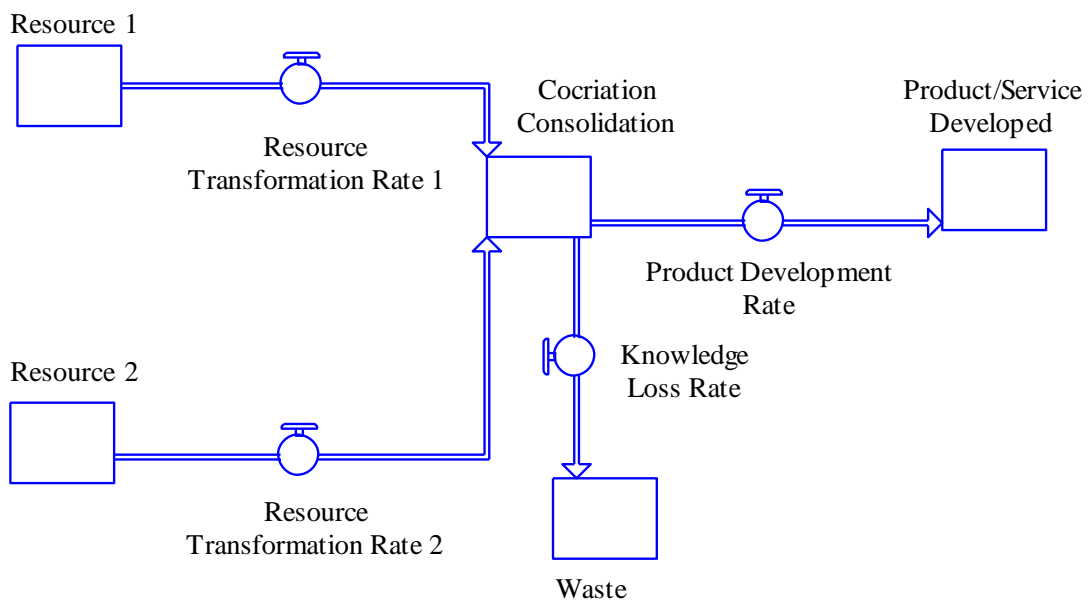
**Source:** The authors.

Aiming to understand which analysis unit most affects the value co-creation process, we sought to observe which stage of the model proposed by Oertzen (2018) each the cause/effects and what are its implications for each other so that the causal loop diagram relations as shown in Figure 4.

Next, the stock and flow diagram for the co-creation flow was prepared, also considering a loss rate in co-creation, as shown in Figure 4.

**Figure 4**

*Stock and flow diagram of co-creation flow*

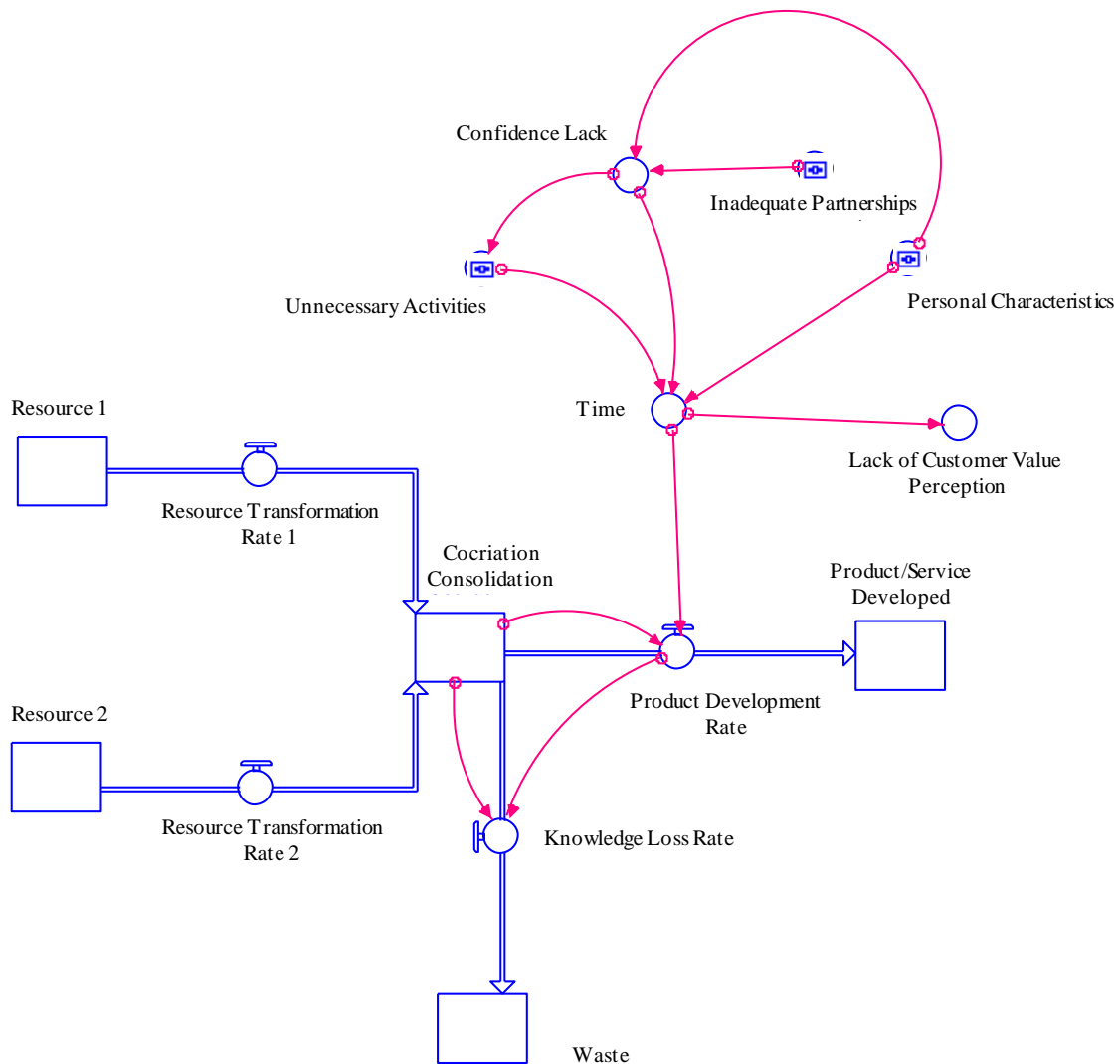


**Source:** The authors.

For the analysis purposes, a hypothetical situation is used, of a co-creation between two organizations, sharing different resources (knowledge, skills, resources), expected to occur in the horizon of 180 days. At this point, the wastes rate resources/knowledge/information has attributed to the value proportionally to the waste influence in the system. In this way, the model representing the co-creation flow diagram with its waste influence was elaborated, as shown in Figure 5.

**Figure 5**

*Value co-creation flow in services*



**Source:** The authors.

With the diagram drawn up, tests were started to compare them with the theoretical co-creation system. The tests performed considered the resources flow in order to develop the product in its entirety, in the period previously stipulated. After this calibration, tests related to extreme conditions were carried out, considering the resources inflow equal to 0, and also considering the system being affected in its



entirety by waste. This way, through the model, was possible to represent theoretical co-creation behavior.

Like waste, it affects the relationships among the parties that interact in co-creation, treating them only for their simplification, “opportunistic behaviors”, do not favor their management and mitigation (Chowdhury et al. 2016). The identification and waste characterization allow actions to be taken for its management.

The wastes control lack makes management difficult, and it can cause wear and tear in the relationship among the parties and thus make it difficult or even impossible to value co-create (Abosag et al. 2016). In this way, the identified waste impacts may vary according to the co-creation scenario, in the resources/knowledge/skills transformation.

In this work, these wastes are considered as absolute rates that vary from 0% to 100%. Where 100% corresponds to the maximum action of the barrier preventing the process from occurring and 0% corresponds to a barrier that does not affect the process. These values are assigned to the system intuitively, seeking the system representation. So, considering that each waste has its rate multiplied by the waste rate that affects it, the same values were assigned to each waste and its impact on the final transformation of co-creation was observed. This impact was measured as co-creation behaves over time, with the interference of wastes according to the proposed model.

The “Time” wastes have their direct interface to the co-creation process while the others have interactions with each other. In this way, the “Time” wastes affect the process flow, prolonging its consolidation (Biggemann et al. 2013, Tsou et al. 2015, West et al. 2018).

Comparing the results, the co-creation flow model pointed out that the waste intitules Personal Characteristics had the greatest impact on the system transformation, due to the fact of interacting with other barriers, influencing other wastes, potentializing his effect on the process.

Next, the impact of the waste called Trust Lack, Inadequate Partnerships was had less impact than the waste Personal Characteristics. The wastes Unnecessary Activities and Time were identified with the least impact on the system, these barriers are directly affected by the others, but do not impact them, have similar impacts on the system. In turn, the Lack of Customer Value Perception did not have an impact on the system. It is worth mentioning that in a practice situation, customer feedback loops this waste would be noticeable, however, in the co-creation flow, this waste appears as a consequence of the other wastes.

## 5 Final considerations

The present study aimed to identify the wastes from the value co-creation in industrial services in a startups context. In addition, trough the dynamic systems approach analyzed the interaction among the wastes in the context of value co-creation in the industrial service environment.

Based on the review findings, it was possible to recognize six wastes from the value co-creation in the startups context. Among them: Time, Confidence lack, Unnecessary Activities, Inadequate Partnership, Personal Characteristics, Lack of Customer Value Perception. Among them, the Personal Characteristics had shown the greatest impact on co-creation about other wastes.

Once recognized these wastes, is possible to guide the players for the management together for the elimination of these. For example, developing quality programs for continuous improvement, construction of tools and procedures for the mitigate the wastes in the value cocreation process in the startups context, based on the wastes listed.

Furthermore, wastes can be considered in the quality aspects for efficiency measures, that is, monitoring the performance of startups, based on value co-creation. In this sense, these measures can help managers in decision-making at different stages for value co-creation in startups.

Concerning results extraction through the simulation by systems dynamics, it was possible to verify a ranking of the waste impact. The interactions identified among the wastes help create management strategies, increasing the understanding of their impacts. The elaborated system dynamics model for co-creation can be used in future studies as a basis for testing waste mitigation, as well as co-creation drivers in the value co-creation in startups. In addition to understanding the interaction of other elements of the environment for co-creation.

We constated that these study findings provide support for decision-making in different knowledge areas related to industrial services. Additionally, the waste in this study listed can serve as guidelines for conducting new studies to overcome the waste presented.

As a limitation, this work uses system dynamics to analyze the interaction only between the identified wastes, not considering the influences of other elements of the environment (micro, meso or macro). Some study opportunities are pointed out. One is related to an empirical test to confirm this waste's presence in practice, as well as to identify other wastes arising from the value co-creation in startups. Another study comprises proposing strategies to overcome this waste through concepts related to Lean Thinking, among other philosophies aimed at continuous improvement in startups context.

**Authors' contributions**

Contribution	Bonamigo, A;	Barbosa, M. A. G.	Werner, S. M.	Andrade, H. S.
Contextualization	X	X	----	----
Methodology	X	X	----	----
Software	----	----	----	----
Validation	X	X	X	----
Formal analysis	----	----	X	----
Investigation	----	X	----	----
Resources	----	----	----	----
Data curation	X	X	X	----
Original	----	X	----	----
Revision and editing	X	X	X	X
Viewing	----	----	----	X
Supervision	X	----	----	X
Project management	X	----	----	----
Obtaining funding	----	----	----	----

**References**

Aarikka-Stenroos, L., & Jaakkola, E. (2012). Value co-creation in knowledge intensive business services: A dyadic perspective on the joint problem-solving process. *Industrial marketing management*, 41: 15-26. <http://dx.doi.org/10.1016/j.indmarman.2011.11.008>

Abosag, I., Yen, D. A., & Barnes, B. R. (2016). What is dark about the dark-side of business relationships?. *Industrial Marketing Management: 55*, 5-9. <http://dx.doi.org/10.1016/j.indmarman.2016.02.008>

Agarwal, R., & Selen, W. (2011). Multi-dimensional nature of service innovation: Operationalisation of the elevated service offerings construct in collaborative service organisations. *International Journal of Operations & Production Management?* 31: 1164-1192. <http://dx.doi.org/10.1108/01443571111178484>

Ali-Marttila, M., Marttonen-Arola, S., Kärri, T., Pekkarinen, O. & Saunila, M. (2017). Understand what your maintenance service partners value. *Journal of quality in maintenance engineering*, 23:144-164. <http://dx.doi.org/10.1108/JQME-08-2016-0035>

Andrade, H. S., Chagas Jr., M. F., Soto Urbina, L. M., Silva, M. B. (2017). Application of a Process Model for the Management of Intellectual Property in a Technology Licensing Office from a Brazilian Research Center. *International Journal of Innovation*, 5: 1-19. <https://doi.org/10.5585/iji.v5i3.206>

Andrade, H. S., Soto Urbina, L. M., Gomes, J., Follador, A. O. N., Chimendes, V. C. G., Follador, R. C. (2016). The Management of Intellectual Property in the Technology License Office in an Open Innovation Environment: The Context of a Scientific and Technological Institution in Brazil. In: Portland International Conference on Management of Engineering and Technology (PICMET), *Proceedings of PICMET '16: Technology Management for Social Innovation*, 1630-1637.

Bardin, L. (2011), *Análise de conteúdo*. 3. reimp. Lisboa: Edições, 70.

- Blank, S. (2013), Why the lean startup changes everything, *Harvard Business Review*, 5: 63-72.
- Bolton, R. & Saxena-Iyer, S. (2009). Interactive services: a framework, synthesis and research directions. *Journal of interactive marketing*, 23: 91-104.  
<http://dx.doi.org/10.1016/j.intmar.2008.11.002>
- Bonamigo, A. (2017). *A management model for dairy production based on the ecosystem business concept*. Doutorado, Universidade Federal de Santa Catarina, UFSC.
- Bonamigo, A. & Frech, C.G., (2020), Industry 4.0 in services: challenges and opportunities for value co-creation. *Journal of Services Marketing*, 35: 412-427. <https://doi.org/10.1108/JSM-02-2020-0073>
- Braun, E. L., Pereira, G. M., Sellitto, M. A. & Borchardt, M. (2017). Value co-creation in maintenance services: case study in the mechanical industry. *Business Process Management Journal*, 23: 984-999. <https://doi.org/10.1108/BPMJ-09-2014-0090>
- Breidbach, C. F. & Maglio, P. P. (2016). Technology-enabled value co-creation: An empirical analysis of actors, resources, and practices. *Industrial Marketing Management*, 56: 73-85.  
<http://dx.doi.org/10.1016%2Fj.indmarman.2016.03.011>
- Callister, R. R., & Wall, J. A., Jr. (2001). Conflict across organizational boundaries: Managedcare organizations versus health care providers". *Journal of Applied Psychology*, 86: 754-763.  
<https://psycnet.apa.org/doi/10.1037/0021-9010.86.4.754>
- Cavallo, A., Ghezzi, A. & Guzman, B.V.R. (2019), Driving internationalization through business model innovation, *Multinational Business Review*, 28: 201-220. <https://doi.org/10.1108/MBR-11-2018-0087>
- Chowdhury, I. N., Gruber, T. & Zolkiewski, J. (2016). Every cloud has a silver lining — Exploring the dark side of value co-creation in B2B service networks. *Industrial Marketing Management*, 55: 97-109. <https://doi.org/10.1016/j.indmarman.2016.02.016>
- D'antonio, G. & Chiabert, P. (2018). How to Manage People Underutilization in an Industry 4.0 Environment?" *IFIP International Conference on Product Lifecycle Management*, Springer, 455-464. [https://doi.org/10.1007/978-3-030-01614-2\\_42](https://doi.org/10.1007/978-3-030-01614-2_42)
- Ferenhof, H. A. & Fernandes, R. F. (2016). "Desmistificando a revisão de literatura como base para redação científica: Método SSF". *Revista ACB*, 21: 550-563.
- Frow, P., Mccoll-Kennedy, J. R., Hilton, T., Davidson, A., Payne, A. & Brozovic, D. (2014). Value propositions: A service ecosystems perspective. *Marketing Theory*, 14: 327-351.  
<https://doi.org/10.1177%2F1470593114534346>
- Gitzel, R., Schmitz, B., Fromm, H., Isaksson, A. & Setzer, T. (2016). Industrial services as a research discipline. *Enterprise Modelling and Information Systems Architectures-An International Journal*, 4: 1-22. <https://doi.org/10.18417/emisa.11.4>
- Fernando, J. T. & Las Casas, A. L. (2018). A cocriação de valor aplicada ao mercado industrial: estudo de caso na empresa kerry do brasil. *Revista de Administração Unimep*, 16: 102-120.  
<http://dx.doi.org/10.15600/rau.v16i1.1295>
- Fierro, J.J.C. & Pérez, L., 2018. Value creation and appropriation in asymmetric alliances: the case of tech startups. *M@ n@ gement*, 21: 534-573. <https://doi.org/10.3917/mana.211.0534>

- Goldratt, E. M., & Cox, J. (2016). *The goal: a process of ongoing improvement*. Routledge.
- Ghezzi, A. (2020), How entrepreneurs make sense of lean startup approaches: Business models as cognitive lenses to generate fast and frugal heuristics, *Technological Forecasting and Social Change*, 161: 120324. <http://dx.doi.org/10.1016/j.techfore.2020.120324>
- Ghezzi, A. & Cavallo, A. (2020), Agile business model innovation in digital entrepreneurship: lean startup approaches, *Journal of Business Research*, 110: 519-537. <https://doi.org/10.1016/j.jbusres.2018.06.013>
- Grönroos, C. & Voima, P. (2013). Critical service logic: making sense of value creation and co-creation. *Journal of the academy of marketing science*, 41: 133-150. <http://dx.doi.org/10.1007/s11747-012-0308-3>
- Heidenreich, S., Wittkowski, K., Handrich, M. & Falk, T. (2015). The dark side of customer co-creation: exploring the consequences of failed co-created services. *Journal of the Academy of Marketing Science*, 43: 279-296. <https://doi.org/10.1007/s11747-014-0387-4>
- Jaakkola, E. & Hakanen, T. (2013). Value co-creation in solution networks". *Industrial Marketing Management*, 42: 47-58. <http://dx.doi.org/10.1016/j.indmarman.2012.11.005>
- Jaakkola, E. & Hallin, A. (2018). Organizational structures for new service development". *Journal of Product Innovation Management* 35: 280-297. <https://doi.org/10.1111/jpim.12399>
- Jesson, J., Matheson, L. Lacey, F. M. (2011). *Doing your literature review: Traditional and systematic techniques*, Sage. <http://dx.doi.org/10.1080/09500790.2011.581509>
- Koskela-Huotari, K., Edvardsson, B., Jonas, J. M., Sörhammar, D. and Witell, L. (2016). Innovation in service ecosystems—Breaking, making, and maintaining institutionalized rules of resource integration. *Journal of Business Research*, 69: 2964-2971. <https://doi.org/10.1016/j.jbusres.2016.02.029>
- Krishna, A., Agrawal, A. and Choudhary, A., (2016), December. Predicting the outcome of startups: less failure, more success. In 2016 *IEEE 16th International Conference on Data Mining Workshops (ICDMW)* (pp. 798-805). IEEE. <https://doi.org/10.1109/ICDMW.2016.0118>
- Letaifa, S. B., Edvardsson, B. & Tronvoll, B. (2016). The role of social platforms in transforming service ecosystems. *Journal of Business Research*, 69: 1933-1938. <https://doi.org/10.1016/j.jbusres.2015.10.083>
- Lusch, R. F., Vargo, S. L. & Gustafsson, A. (2016). Fostering a trans-disciplinary perspective of service ecosystems". *Journal of Business Research*, 69: 2957-2963. <https://doi.org/10.1016/j.jbusres.2016.02.028>
- Maglio, P. P. and SPOHRER, J. (2008). Fundamentals of service science. *Journal of the academy of marketing science*, 36: 18-20. <https://doi.org/10.1007/s11747-007-0058-9>
- Moore, J. F. (1996). *The death of competition: leadership and strategy in the age of business ecosystems*, HarperCollins Publishers.
- Oertzen, A.-S., Odekerken-Schröder, G., Brax, S. A. & Mager, B. (2018). Co-creating services—conceptual clarification, forms and outcomes. *Journal of Service Management*, 29: 641–679. <https://doi.org/10.1108/JOSM-03-2017-0067>

- Panesar, S. S. & Markeset, T. (2008). Development of a framework for industrial service innovation management and coordination. *Journal of Quality in Maintenance Engineering*, 14: 177-193. <https://doi.org/10.1108/13552510810877674>
- Priya Datta, P. & Roy, R. (2011). Operations strategy for the effective delivery of integrated industrial product-service offerings: two exploratory defense industry case studies. *International Journal of Operations & Production Management*, 31: 579-603.
- Pullen, A., De Weerd-Nederhof, P., Groen, A., Song, M. & Fisscher, O. (2009), Successful patterns of internal SME characteristics leading to high overall innovation performance, *Creativity and Innovation Management*, 18: 209-223. <https://doi.org/10.1111/j.1467-8691.2009.00530.x>
- Ramaswamy, V. (2011). It's about human experiences... and beyond, to co-creation. *Industrial Marketing Management*, 40: 195-196. <http://dx.doi.org/10.1016/j.indmarman.2010.06.030>
- Ramaswamy, V. & Ozcan, K. (2014). *The co-creation paradigm*, Stanford University Press.
- Rashwan, W.; Abo-Hamad, W. & Arisha, A. (2015). A System Dynamic View Of The Acute Bed Blockage Problem In The Irish Healthcare System. *European Journal Of Operational Research*, 247: 276-293. <https://doi.org/10.1016/j.ejor.2015.05.043>
- Rexfelt, O., Almefelt, L., Zackrisson, D., Hallman, T., Malmqvist, J. & Karlsson, M. (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*, 22: 153-171. <http://dx.doi.org/10.1007/s00163-011-0104-y>
- Sterman, J. D. (2020). *Business dynamics: systems thinking and modeling for a complex world*.
- Vargo, S. L. & Akaka, M. A. (2012). Value cocreation and service systems (re) formation: A service ecosystems view". *Service Science*, 4: 207-217. <http://dx.doi.org/10.1287/serv.1120.0019>
- Vargo, S. L. Lusch, R. F. (2008). Service-dominant logic: continuing the evolution. *Journal of the Academy of marketing Science*, 36: 1-10. <https://doi.org/10.1007/s11747-007-0069-6>
- Wahab, A. N. A., Mukhtar, M. & Sulaiman, R. (2013). A conceptual model of lean manufacturing dimensions. *Procedia Technology*, 11: 292-1298. : <https://doi.org/10.1016/j.protcy.2013.12.327>
- Waseem, D., Biggemann, S. & Garry, T., (2020), An exploration of the drivers of employee motivation to facilitate value co-creation. *Journal of Services Marketing*: Vol. ahead-of-print. <http://dx.doi.org/10.1108/JSM-11-2019-0458>
- West, S., Gaiardelli, P., Resta, B. & Kujawski, D. (2018). Co-creation of value in Product-Service Systems through transforming data into knowledge. *IFAC-PapersOnLine*. 51: 1323-1328. <https://doi.org/10.1016/j.ifacol.2018.08.349>
- Womack, J. & Jones, D. (2003), *Lean Thinking: Banish Waste and Create Wealth in Your Corporation*. Free Press, Rockland, Me, USA.
- Wolfson, A. (2016), *Sustainable service*, Business Expert Press.
- Zott, C., & Amit, R. (2008), The fit between product market strategy and business model: implications for firm performance, *Strategic Management Journal*, 29: 1-26. <https://doi.org/10.1002/smj.642>