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**CRITICAL SUCCESS FACTORS IN SHARED MOBILITY SERVICE
OPERATION: CARSHARING SERVICE CASE STUDY**

THESIS

CURITIBA – BRAZIL
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MANUELA GORTZ BONALDO

**CRITICAL SUCCESS FACTORS IN SHARED MOBILITY SERVICE
OPERATION: CARSHARING SERVICE CASE STUDY**

This thesis was presented as a partial requirement for obtaining the Doctor in Technology and Society title by the Postgraduate Program in Technology and Society at the Federal University of Technology – Parana.

Area of concentration: Technology and Society.

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**Ministério da Educação
Universidade Tecnológica Federal do Paraná
Câmpus Curitiba**



MANUELA GORTZ BONALDO

**FATORES CRÍTICOS DE SUCESSO NA OPERAÇÃO DE SERVIÇO DE MOBILIDADE COMPARTILHADA:
ESTUDO DE CASO DO SERVIÇO DE CAR-SHARING**

Trabalho de pesquisa de doutorado apresentado como requisito para obtenção do título de Doutora Em Tecnologia E Sociedade da Universidade Tecnológica Federal do Paraná (UTFPR). Área de concentração: Tecnologia E Sociedade.

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To God, from whom all wisdom comes.

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“Mobility is essentially the physical means of making connections” (Coxon, Napper, and Richardson, 2019, p.203).

ABSTRACT

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In recent years, the offer of shared mobility services, such as carsharing and bike sharing, has increased. However, while they are created, the companies that provide these services also close their activities, many with a short time of operation (5 years or less). Therefore, the goal of this dissertation is to determine the critical success factors in the operation of a solution-demand network for shared mobility services. This study is justified in the theoretical field by advancing in the knowledge about which factors are more critical in the operation of shared mobility services. In the practical field, this research contributes to the factors and actions that should be considered by shared mobility services companies, aligned with the interests and motivations of the other actors of the service network, such as their consumers, suppliers, and city halls. The research is classified as descriptive according to its objective, with a qualitative approach, by applying the multiple case study method. This study was conducted in three major stages. First, a Systematic Literature Review was carried out, supported by the PRISMA recommendation, to propose a conceptual-theoretical model using inductive content analysis. Then, case studies were conducted by selecting six carsharing service providers, with data collection published by users of these services on Twitter and Yelp, using netnographic techniques and survey through online questionnaires. Finally, the data collected on the cases were compared with the proposed theoretical-conceptual model through deductive content analysis. As a result, 18 critical success factors were established, grouped into four groups: (1) User experience follow-up, (2) Service quality monitoring, (3) Business model adaptation, and (4) Interaction between actors in the network. These critical factors are interrelated and should be observed in the operation of a solution-demand network of shared mobility services. Therefore, understanding these critical success factors contributes not only to the companies that provide these services but also to other actors that constitute the solution-demand network for shared mobility services operation.

Keywords: Shared mobility. Carsharing. Service Design. Solution-demand network. Critical Success Factors.

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LIST OF ACRONYMS AND INITIALS

ANT	Actor Network Theory
B2B	Business-to-Business
B2C	Business-to-Customer
C2C	Customer-to-Customer
CSF	Critical Success Factors
IBICT	Brazilian Institute of Information in Science and Technology
MaaS	Mobility as a Service
P2P	Peer-to-Peer
PPGTE	Postgraduate Program in Technology and Society
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PSS	Product-Service Systems
SD	Service Design
SDL	Service Dominant Logic
SDN	Solution-Demand Networks
SE	Sharing Economy
TD	Technology and Development
UTFPR	Federal University of Technology - Parana

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1 INTRODUCTION

This initial chapter presents the research topic and its delimitations, the problem, the research question, and the thesis proposal. It also explains the research objectives (general and specific) and the theoretical and practical justifications. Furthermore, it exposes the thesis methodological procedures, the theoretical basis, and the chapters' general structure.

1.1 TOPIC

Traditional industrial-based economic models focused on exploiting natural resources, high production rates, and rapid disposal of goods are considered responsible for materialism and linking the feeling of happiness to the possession of artifacts (Belk, 2007; 2014b; Vasques, 2015). However, increasing environmental concern and awareness and changes in consumption and ownership habits, especially of new generations (Kumar, Lahiri, and Dogan, 2018), are opening promising paths for economic models that emphasize access and experience using products instead of their possession (Rifkin, 2001).

One of these solutions is the Functional Economy, which emphasizes access to the function a product offers (Gidel, Huet, and Bisiaux, 2016; Stahel, 1997). Another proposal is integrating products and services through product-service systems (PSS), leading to positive economic and environmental effects for industry and society (Goedkoop et al., 1999; Mont, 2002).

In addition to these, other solutions have also emerged aimed at the shared use of underutilized resources and goods, such as the sharing economy, and proposals for collaborative consumption and access-based consumption (Bardhi and Eckhardt, 2012; Belk, 2014a; Botsman and Rogers, 2010). In this sharing economy scenario, the accommodation and transport sectors are the fastest growing (Wang, Lian, and Zhao, 2019).

Nowadays, we are experiencing an increasing offer of shared mobility services, in examples such as bike sharing, carsharing, ridesharing, intermodal

integration services, and mobility as a service (Alemi et al., 2018; Möhlmann, 2015; Shaheen and Chan, 2016).

Most of these examples offer access to products through services; idea also present in the Service-Dominant Logic (Vandermerwe and Rada, 1988; Vargo and Lusch, 2004a; 2017), which emphasizes co-creation among stakeholders. Furthermore, many of these new services have been made possible by technological advances. For Möhlmann (2015), collaborative consumption extends to areas that were previously non-collaborative due to social, economic, and technological factors. The rise of the Internet plays a fundamental role in this process. It facilitates the constitution of online communities and networks with low transaction costs. Furthermore, mobile applications allow an even more instantaneous exchange of information (Bardhi and Eckhardt, 2012).

To respond to these new instigations, services must be designed for multiple channels and media, enabling flexible service experiences that meet consumer expectations. Moreover, customer satisfaction is one of the aspects that can contribute to their loyalty and dissemination of the service. Therefore, academics and professionals should understand how companies can establish the capacity to manage the quality of services in their optimization and innovation (Zuo et al., 2019).

Faced with these challenges, Service Design can make significant contributions. Service Design presents an iterative, creative, and human-centered approach to creating new services. It incorporates several contributions from marketing, operations, and information technology, based on methods and tools adapted from the Design field (Moritz, 2005; Ostrom et al., 2015). Service Design's relevant and fundamental role is highlighted not only in creating and implementing new services but also in considering the stage of operation of services already in operation, with constant revisions to optimize their potential (Moritz, 2005).

Services can also be understood as a value delivery network, composed of different stakeholders, with different motivations to be part of this network. Therefore, a positive experience of using these services requires consistency and integration of the entire network of actors involved in service provision and delivery (Ostrom et al., 2015). Thus, service providers largely depend on the co-creation of value with customers and other actors involved in the network (Reim, Parida, and Örtqvist, 2015) to deliver solutions that collaboratively meet consumers' demands in solution-demand networks.

Based on some principles of the Actor-Network Theory (Callon, 1986; 1999; Latour, 1996; 2005; Law, 1992), solution-demand networks are heterogeneous networks formed by different actors, which, through processes of translation, negotiation, cooperation, and co-creation, are articulated around a common objective, aimed at proposing a solution to an existing demand, or at specifying a demand for an available solution (Gortz, 2017).

Thus, service operation can be understood as a solution-demand network, consisting of several human and non-human actors, such as service providers, suppliers and manufacturers, maintenance companies, artifacts that allow the offer of the service (vehicles and devices), and service consumers (Grieger and Ludwig, 2018). Through processes of translation, enrollment, mobilization, and coordination, the actor's network can act for the co-creation of value (Baraldi et al., 2019; Grönroos and Voima, 2012; Vargo and Lusch, 2017) through joint and collaborative action between all actors involved. The dynamics that prevail in a service's solution-demand network can define its continuity, constituting its success, or failure, leading to its interruption (Laczko et al., 2019).

Consequently, a service provider company must consider the Critical Success Factors (CSF), the internal or external factors that need to be identified and considered because they support or threaten the organization's existence (Ferguson and Dickinson, 1982). CSF are also understood as the determining variables for organizational success or failure, consisting of characteristics or conditions that, when adequately supported, maintained, or managed, can significantly impact a company's success that competes in a particular sector (Leidecker and Bruno, 1984).

Therefore, this research considers the sharing economy context, specifically the service proposals of collaborative consumption and access-based consumption. It is also based on Service Design, together with the principles of the Actor-Network Theory, which can contribute to the study of the dynamics of operation and maintenance of these solution-demand networks for shared mobility services.

1.2 DELIMITATION OF THE RESEARCH TOPIC

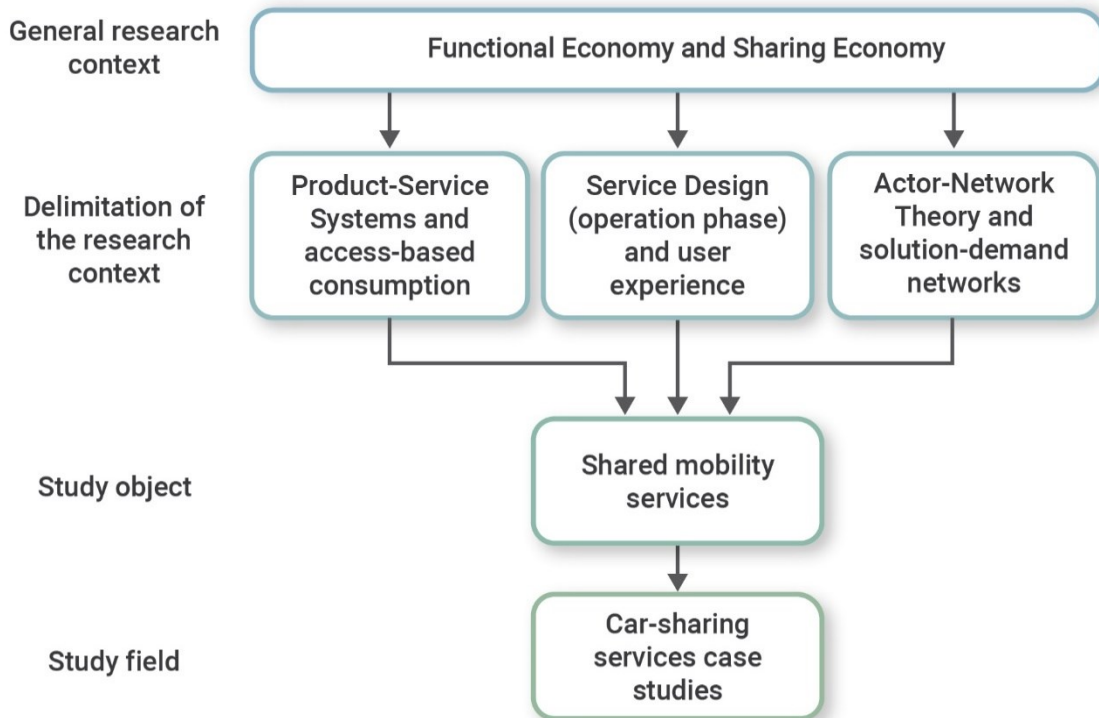
There are several proposals for new alternative and sustainable economic models, such as Green Economy, Circular Economy, Distributed Economy, Sufficient Economy, Design for Sustainable Behavior. Thus, the methodological option adopted in this research is to approach strategies of product-service systems, besides services that focus on collaborative consumption and access-based consumption, considering the context of the sharing economy.

Since these services constitute a solution-demand network comprised of multiple actors, the conceptual alignment of this research is the study of relationships and dynamics in networks between human and non-human actors in these systems. Regarding the analysis of solution-demand networks within the sharing economy, Actor-Network Theory (ANT) principles will be used, such as the concepts of heterogeneous networks, the translation process, mobilization, and network coordination.

In addition, most access-based consumption offers are designed in the form of services that enable access to product functions. Therefore, this study brings contributions from Service Design, considering mainly aspects related to the service operation stage by provider companies and concepts related to user experience and service quality.

Because the transport sector is one of the most discussed in the context of the sharing economy, the focus of this thesis is on shared mobility services. Of these, the research analyzes carsharing services more deeply, from the perspective of three groups of actors: (1) the users of these services, (2) its providing companies, and (3) city halls or local authorities of cities with these services in operation. Figure 1 summarizes this delimitation of the research context.

Figure 1 – Delimitation of the research context



Source: Own Authorship (2021).

After presenting the theme and its delimitation, the research problem and the proposed thesis are discussed below.

1.3 RESEARCH PROBLEM AND THESIS

New consumption models, such as the sharing economy and access-based use, bring challenges for companies, requiring business models that go beyond the simple offer of a service (Zhang, Jahromi, and Kizildag, 2018). In addition, in a scenario with more and more choices for the consumer, companies need to find ways to stand out from the competition to keep and attract new customers (Perboli et al., 2018).

In this context, shared mobility services are currently increasingly common. New bike, scooter, and carsharing companies are frequently emerging worldwide (Ta, Esper, and Hofer, 2018). However, despite some companies' success in this

segment, others struggle to survive (Huang and Kuo, 2020). Many of these businesses do not have continuity, which directly impacts companies, also bringing consequences for their users and territories where they operate.

For Bardhi and Eckhardt (2012), one of the limitations in using shared services is that people only use them a few times to experience the novelty of the moment, resulting in a lack of connection and consumer loyalty. In addition, many companies focus their efforts on the service creation and implementation phases, where all stakeholders involved are initially well-aligned, and users themselves are more open to experience an innovative service (Coxon, Napper, and Richardson, 2019).

However, over time, the same efforts applied in creating and implementing a service are not maintained. There is no concern and effort to constantly revise and maintain the service operation to optimize its potential (Moritz, 2005). As a result, the service is no longer new to consumers, who are not interested in continuing to use it (Cheng, Fu, and Vreede, 2018; Lee, Lee, and Kim, 2019). Consequently, many shared mobility services lose users in parts because they no longer carry out the necessary maintenance and repairs (Lagadic, Verloes, and Louvet, 2019; Yin, Qian, and Shen, 2019).

Furthermore, there are several other problems related to the continuity of these services' operation, such as factors associated with the success of the business model (Silva, 2019), the customer experience (Ampudia-Renuncio, Guirao, and Molina-Sanchez, 2018), or even to public-private partnership agreements (Terrien et al., 2016). Therefore, understanding the factors that determine the success or failure of sharing economy services is a critical issue (Huang and Kuo, 2020). Thus, the practical problem of this study is the challenge of these provider companies in maintaining the continuity of their shared mobility services.

Therefore, the research problem is the lack of knowledge about the nature and intensity of the set of most essential factors in the operation of a solution-demand network of shared mobility services, more specifically, in the case of carsharing services.

Supported by the critical analysis of this context, this study seeks an answer to the following research question:

What are the main critical success factors in the operation of a carsharing service solution-demand network?

The thesis defended in this research is that the main critical success factors for operating a carsharing service solution-demand network are related to a set of elements that consider the user experience, the service quality, the business model, and the actors' interactions in the network.

1.4 OBJECTIVES

This section presents the general objective and the specific objectives.

1.4.1 General Objective

To determine the critical success factors in the operation of a carsharing service solution-demand network.

1.4.2 Specific Objectives

To achieve the proposed general objective, the following specific objectives were outlined:

- a) Discern the main factors involved in the operation of shared mobility services.
- b) Identify the main actants and their interactions in the operation of carsharing services.
- c) Correlate factors and actants with cases of continuity and interruption of carsharing services.

1.5 THEORETICAL AND PRACTICAL JUSTIFICATION

This section describes the theoretical justification (concepts and methods), the research gaps, and the practical justification of this thesis.

1.5.1 Theoretical Justification

Although the sharing economy is a topic of increasing discussion and interest, partly because of the success of companies such as Airbnb and Uber, Li (2019) argues that academic research in this context is still in its early stage. For Murillo, Buckland, and Val (2017), research related to sharing economy lacks theoretical bases to categorize and fully address its impacts, dilemmas, and theoretical obstacles. Vezzoli et al. (2015) also highlight that the emergence of new models such as the sharing economy and collaborative consumption can be seen as an opportunity to be explored in favor of accepting solutions oriented towards product-service systems. Therefore, this research is relevant in the face of an emerging theme that still presents a developing theoretical bibliography.

Moreover, there are different relationships involved in the sharing economy, whether between consumer-to-product, business-to-customer, customer-to-customer, and business-to-business. Considering these relationships, Somers, Dewit, and Baelus (2018) point out a lack of research to investigate what drives and makes consumers remain in relationships with service providers. For Islam et al. (2019), scholars and professionals have long recognized the importance of superior service quality in creating long-term links between customers and their brands. However, the importance of service quality as a tool to improve customer engagement remains little explored (Islam et al., 2019). Hence, it is important to advance in studies that address the motivations for the long-term relationship between customers and companies in the context of the sharing economy.

Considering, further, the theoretical concepts discussed in this thesis, the research is justified by the possibility of advancing in the knowledge of the Actor-Network Theory by contributing to a better understanding of network dynamics and

the co-creation relationship between the actors involved in service demand-solution networks of shared mobility.

To verify the validity of the statements about the scarcity of research related to the subject and to deepen studies in the area, a bibliometric survey was carried out between the months of July and August 2020, which sought to collect the results of research relating the combination of terms such as: Shared Economy, Shared Mobility, Service Design, Service Success, Co-creation, Networks and Actor-Network Theory.

The investigation was carried out in four international scientific bases: Science Direct, Scopus, Web of Science, and ProQuest. These were selected for their relevance to the research topic. Nationally, the Brazilian Institute of Information in Science and Technology (IBICT) – Oasisbr was selected. It consists of a Brazilian portal for scientific publications in open access, with articles, theses, and dissertations. The research raised publications comprised in the last five years (2015-2020). Table 1 shows the initial results.

Table 1 – Keyword Search Results

KEYWORDS	RESULTS
<i>“Service Design” AND “Shared mobility”</i>	40
<i>“Service Design” AND “Sharing economy”</i>	118
<i>“Service success” AND “Shared mobility”</i>	1
<i>“Service success” AND “Sharing economy”</i>	4
<i>“Service failure” AND “Shared mobility”</i>	4
<i>“Service failure” AND “Sharing economy”</i>	42
<i>“Service operation” AND “Shared mobility”</i>	2
<i>“Service operation” AND “Sharing economy”</i>	12
<i>“Shared mobility” AND “Actor-Network Theory”</i>	3
<i>“Sharing Economy” AND “Actor-Network Theory”</i>	14
<i>“Service Design” AND “Actor-Network Theory”</i>	27
<i>“Service Design” AND “Shared mobility” AND “Actor-Network Theory”</i>	0
TOTAL	315

Source: Own Authorship (2021).

The results of this initial survey in the delimited time frame show that although there are already publications that relate Service Design with sharing economy and shared mobility, only a few studies address the focus prioritized in this research, as correlating service operation and the success or failure of services with

sharing economy and shared mobility solutions. In addition, studies already published emphasize more the issues of reducing carbon emissions by electric carsharing services. Other studies seek to understand the rate of reduction of cars in circulation due to carsharing, besides studies that emphasize other shared mobility services such as taxi or ridesharing.

Table 1 also shows the relationship of the concepts of sharing economy, shared mobility, and Service Design with the Actor-Network Theory (ANT), one of the conceptual focuses of the research. It seems, therefore, that although some studies have already addressed the relationship of ANT with Service Design or with sharing economy, few deepen the relationship of ANT with shared mobility studies, and even less in the combination of the three concepts.

Thereby, it is possible to observe the originality of the research as it seeks to deepen the relationship between the concepts of Service Design, operation, success, and failure of services in the context of shared mobility and its relationship with the principles of the Actor-Network Theory.

Nevertheless, the scarcity of studies alone does not justify the relevance of the research. Thus, research gaps mentioned by different authors were identified in the theoretical framework.

Among the authors who suggest the continuation and conduct of more studies with approaches related to the sharing economy, collaborative consumption, and shared mobility services, the following are mentioned: the recommendation to conduct research on success factors in collaborative consumption platforms, stating that it is still not clear why some platforms are successful, and others are not (Benoit et al., 2017); studies that consider the operation and the relationship between quality, satisfaction, and loyalty in services of the economy and shared mobility (Akhmedova, Marimon, and Mas-Machuca, 2020; Zhang, Gu, and Jahromi, 2019) and researches that consider more than one country, allowing the comparison between services from different countries (Akhmedova, Marimon, and Mas-Machuca, 2020; Cherubini, Iasevoli, and Michelini, 2015; Javaid and Kohda, 2019; Marimon, Mas-Machuca, and Llach, 2020).

Regarding shared mobility services, Silva (2019) also suggested potential research topics involving critical success factors (CSF) for carsharing services, which can address the definition of other business success criteria, considering indirect attributes, as active companies, and business survival.

Gaps were also found mentioning the relevance of research that emphasizes services' operation and the importance of creating in-depth knowledge in this field (Field et al., 2018). Finally, considering the relationship between the different actors and stakeholders present in a service network: Grieger and Ludwig (2018) recommend conducting research that translates research insights into services on the co-creation of network value and customer-centricity; Suri, Huang, and Sénécal (2019) suggest research on the relationship between service providers and consumers, especially on failure in the sharing economy; and Huang and Kuo (2020) hint new studies that investigate CSF in the sharing economy from multiple perspectives, considering employees, suppliers, and the general public.

Hence, concerning methodological choices, the relevance and novelty of this thesis are justified by considering not only the user's perception or only the perspective of companies and managers, but considering different groups of actors in the service network, which can contribute to a more comprehensive view of critical factors from the perspective of various stakeholders.

Regarding the sources and types of data, authors such as Suri, Huang, and Sénécal (2019) suggest more research that considers the opinion of the user's electronic word-of-mouth (eWoM¹), both positive and negative, for the growing sharing economy. Zuo et al. (2019) used eWoM as a data source to analyze a carsharing platform and suggest future research using questionnaire surveys, interviews, and online public opinions as research materials. Therefore, the methodological relevance of this thesis is justified by combining the data collected by questionnaires and considering the eWoM of user comments in the online environment to analyze the perspective of consumers of shared mobility services from different sources.

Table 2 presents the synthesis of these main gaps mentioned above.

¹ Electronic, digital, or online disclosure of the customer's experience of using a service, also called electronic word-of-mouth. (Yin, Qian, and Shen, 2019).

Table 2 – Research gaps identified in the theoretical framework

AUTHORS	IDENTIFIED GAPS
Akhmedova, Marimon, and Mas-Machuca, 2020	These authors developed a study on the relationship between service quality and loyalty in the sharing economy. They applied their research considering the service in only one country; thus, they suggest increasing the sample and conducting comparisons between countries. They also recommended specifying the search for only one segment of the sharing economy, such as accommodation or mobility.
Benoit et al. (2017)	They recommend researching success factors in collaborative consumption platforms, claiming it is still unclear why some platforms are successful while others are not.
Cherubini, Iasevoli, and Michelini (2015)	They identify CSF in electrical carsharing systems that operate in some European countries and suggest similar research that considers carsharing services from other countries.
Field et al. (2018)	They point to the relevance of service operation research and the importance of creating in-depth knowledge in this field.
Grieger and Ludwig (2018)	They recommend conducting research that translates service research insights about networked value co-creation and customer-centricity into communicable methods and tools applicable to manufacturers developing digital products and service offers.
Huang and Kuo (2020)	They carried out research with students on CSF in several types of services in the sharing economy. However, they obtained few respondents for each type of service (less than 10). Therefore, they suggest carrying out surveys with a more significant number of respondents and different respondent profiles to increase the generalizability of the results. Furthermore, they emphasize the perspective of service users and suggest new studies that investigate CFS from multiple perspectives, considering employees, suppliers, and the general public.
Javaid and Kohda (2018)	Research on the potential of shared economy business models in developing countries, highlighting the continuation of other related studies. The authors suggest conducting surveys with stakeholders on business models of the sharing economy from other developing countries.
Marimon, Mas-Machuca, and Llach (2020)	The authors indicate an opportunity for further research that investigates the relationship between quality, satisfaction, and loyalty in the context of the sharing economy. Their survey was carried out with a sample from only one country, so they suggest surveys that allow comparison between countries.
Silva (2019)	The author suggests potential research topics involving carsharing services, which may address: the definition of other business success criteria, considering indirect attributes (active company, survival); the elaboration of more specific surveys, which individually investigate each of the shared mobility services: round-trip and one-way carsharing services.
Suri, Huang and Sénécal (2019)	These authors studied the failure of access-based services considering services where there is a triad relationship: platform provider, service provider, and consumer. They suggest research that considers the dyadic relationship between service providers and consumers, stating that consumers can play a relevant role in these cases. They claim that there is a significant amount of research in the literature on service failure, but failure in the sharing economy is still poorly explored. Therefore, they suggest carrying out more studies to advance knowledge about the growing sharing economy.
Zhang, Gu, and Jahromi (2019)	These authors suggest future research that studies the constructions associated with customer value in the context of the sharing economy, such as service quality, customer satisfaction, and loyalty.

Source: Own Authorship (2021).

Thus, the relevance and novelty of the thesis are justified in the delimitation of the theme, which is still little explored. It is also relevant in the advancement of knowledge, by seeking to fill the gaps pointed out by authors and by the originality in the combination of data that consider different actors' perspectives in the sharing economy's service network.

After presenting the theoretical justification, the following section describes the practical contributions of this study.

1.5.2 Practical Justification

Regarding the research problem, the practical contributions of this study are essential for service providers in the context of the sharing economy, access-based consumption, and shared mobility services. By pointing out the critical factors for the success of these services' solution-demand networks, the research brings contributions to these companies on the aspects that interfere and contribute to the continuity of the operation of their services. Furthermore, understanding these factors also contributes to the other actors participating in this solution-demand network, whether users, suppliers, or manufacturers, to continue to act and benefit from the service.

Cheng (2016) considers that given the practical implication of service quality in user loyalty and the lack of comprehensive studies to understand the influencing mechanisms in the online and offline contexts of the sharing economy, it is necessary to research the question of service quality concerning user loyalty in this new context. Thus, the aspects of this research that address user experience and service quality in the context of the sharing economy can also contribute to bringing the relationship of service providers closer to their customers.

In the practical sphere, this study also contributes to the author's undergraduate area and future professionals in the field of Design. Service Design is a recent and promising field (Stickdorn and Schneider, 2010). Moreover, Pearce (2016) highlights a gap between theory and practice in the field of Service Design, especially in constantly changing contexts such as new economic models (Ostrom et al., 2015). Therefore, in addition to theoretical advances, there is importance in bringing practical contributions to professionals in the field of Design, particularly to aspects of service operation (Field et al., 2018).

Furthermore, Moritz (2005) states that service sector professionals need to realize that they are involved in the design field and can use Service Design to improve it, helping to address the unique challenges that the service economy is facing. Therefore, the research contributes to design professionals and can benefit other stakeholders by opening new partnership opportunities and allowing an expansion of the network of actors involved in new shared mobility services. Vezzoli et al. (2015) point out that the development and provision of PSS require strong

collaboration between actors by supporting innovative networks of stakeholders in the co-production of value and promoting the development of the local economy. Thus, the practical contributions of this research can help companies, entrepreneurs, suppliers, and producers interested in developing new solutions within the sharing economy scope.

To conclude the justifications for this research, it is worth highlighting its relevance for the development of scientific knowledge. Rooted at the Federal University of Technology of Paraná (UTFPR), the thesis is aligned with the objectives of the Graduate Program in Technology and Society (PPGTE), specifically with the Technology and Development research line. The line's objectives are the studies aimed at the necessary conditions for the continuous and durable development of the territory, manifesting themselves as processes designed and implemented on the tripod of sustainability when considering social, economic, and environmental aspects (PPGTE, 2017). The research results can contribute to the reflections of the research line in the analysis of elements of the transformation and enhancement of the territory conducted by groups of actors, who collaborate in networks of social, economic, and environmental relationships, with strategies aimed at more sustainable practices of production and consumption. It also contributes to territory and urban mobility aspects, as shared mobility solutions offer new solutions to optimize the integrated use of urban transport and bring environmental improvements in the use of electric vehicles.

In addition, this thesis contributes to the Territory Research Group: Networks, Policies, Technology, and Development, in which the author participates. Focused on research related to policies, dynamics, environments, and tools for promoting the development of territories, the research group assumes that development is a process that involves the design, prospecting, planning, mobilization, and coordination of cooperation networks, involving actors and resources of different natures (Conselho Nacional de Desenvolvimento Científico e Tecnológico, 2021). Consequently, the research contributes to the group's activity by studying solution-demand networks in shared mobility services within the scope of the sharing economy. Beyond that, this study of networks contributes to the advancement of research carried out by the research group on the Actor-Network Theory in the field of Science, Technology, and Society (Callon, 1986; Law, 1992; Latour, 2005), by

addressing the dynamics of relationships in a network between human and non-human actors, in processes of translation, enrollment, mobilization and coordination.

Finally, this research also contributes to the continuity of the thesis advisor's research work, particularly to the advancement of studies on trust in the relationship between actors in sociotechnical networks.

1.6 THEORETICAL BASIS

This study aims to present the contextualization of the themes in sharing economy, Service Design, Actor-Network Theory, and shared mobility, referencing both base authors and recent publications to these topics, obtained by systematic literature review.

Regarding the sharing economy context, therefore, this research addresses the works of Belk (2010; 2014a; 2014b), Botsman and Rogers (2010), more specifically the concepts of collaborative consumption (Möhlmann, 2015) and access-based consumption studied by Botsman and Rogers (2010) and Bardhi and Eckhardt (2012). Furthermore, considering the case studies of carsharing services, the thesis also discusses shared mobility services in publications such as those by Alemi et al. (2018) and Shaheen and Chan (2016).

In approaching the concepts of Service Design, the contributions of Bitner, Ostrom, and Morgan (2008); Coxon, Napper, and Richardson (2019); Grönroos (1984) and Moritz (2005) stand out. Related to service quality issues, the research discusses Parasuraman, Zeithaml, and Berry (1985; 1988) and Yamada (2019) when observing issues related to feedback systems, reputation assessment, and social media.

Concerning the studies on the dynamics between actors in the solution-demand network, there are contributions from Grieger and Ludwig (2018) and Turetken et al. (2019), besides the co-creation aspects of value studied by Prahalad and Ramaswamy (2004), Vargo and Lusch (2017). These concepts are also based on the principles of the Actor-Network Theory in the seminal works of authors such as Callon (1986), Law (1992), and Latour (1996; 2005).

Finally, the contributions regarding the methodological procedures consider the propositions of Yin (2001) and Santos et al. (2018) for the case study method and the directions of Moher et al. (2015) and Taveira et al. (2018) on systematic literature review and use of the PRISMA recommendation. The procedures for data collection are based on the proposals of Kozinets (2002) regarding netnography and Lakatos and Marconi (2003) regarding questionnaires. The recommendations of Bardin (2011), Elo and Kyngäs (2008), and Erlingsson and Brysiewicz (2017) on content analysis are also applied to analyze the collected data.

1.7 METHODOLOGICAL PROCEDURES

Observing the criteria for research classification proposed by Gil (2010), regarding the results, this is applied research since it is an original work to acquire new knowledge on the topic of study and is fundamentally directed to a specific practical objective (Organização para a Cooperação e Desenvolvimento Económico, 2007). As for the characterization of the problem and the purpose of the study, this is descriptive research, since its general objective is to verify the existence of associations and the establishment of relationships between variables (Gil, 2010).

The characterization of the problem and the selection of research methods are influenced by the study's philosophical position (Santos, 2018). The thesis presents a qualitative and multiparadigm approach, adopting a hybrid solution that moves between interpretivism and positivism (Santos, 2018), considering the intersections between the two approaches (Lima, 2011). Hence, the research starts with an interpretive and inductive approach to understanding the problem and then adopts a positivist and deductive approach to make inferences and verify the relationships between variables (Santos, 2018).

As for the problem approach through technical procedures, this is qualitative research, considering the existence of a dynamic relationship between the natural world and the subject, which cannot be translated into numbers, in addition to presenting the process and its meaning as a focus of approach (Silva and Menezes, 2005). According to Gil (2010), qualitative analysis is less formal and can be

developed through a sequence of activities that involves data reduction, data categorization, interpretation, and report writing.

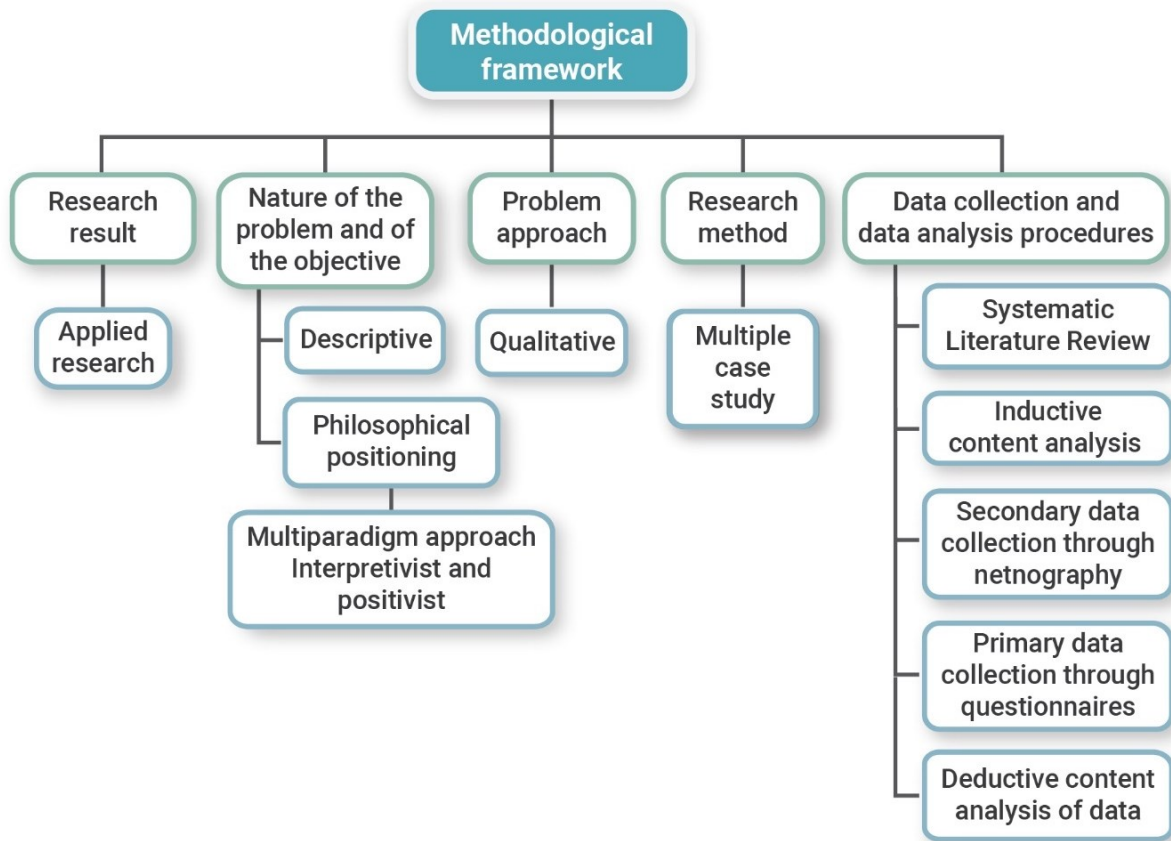
As for the research method selection, the research applies multiple case study, to reach an understanding of a recent event, in the identification and description of relevant variables about this event, and the characterization of the dynamics of the relationships between them (Yin, 2001).

During the development of a study, it is also usual to adopt a sequence of different research methods to meet the specific objectives outlined (Santos, 2018). Therefore, although the primary research method is the multiple case study, other strategies adopted involve the combination of methods, applied at three different stages:

- 1) Conducting bibliographic research through systematic literature review, applying an inductive content analysis technique to define a theoretical-conceptual model.
- 2) Conducting case studies by collecting data on selected carsharing services through netnographic techniques and surveying through questionnaires.
- 3) Analysis of collected data by comparison with the theoretical-conceptual model by deductive content analysis.

Figure 2 presents a summary of the thesis' methodological framework classification.

Figure 2 – Synthesis of the research methodological framework



Source: Own Authorship (2021).

There are three macro steps considering the case study method and its research operationalization, applying different procedures for data collection and analysis. First, bibliographic research is carried out to collect secondary data based on published materials, mainly books and scientific articles (Gil, 2010). Therefore, a bibliometric survey was applied for the initial collection of publications indexed in scientific bases, followed by a systematic literature review supported by the PRISMA recommendation, to identify the authors that constituted the theoretical framework (Moher et al., 2015). After collecting these secondary data, it was possible to conduct an inductive content analysis (Bardin, 2011; Elo and Kyngäs, 2008), resulting in the proposition of a conceptual-theoretical structure.

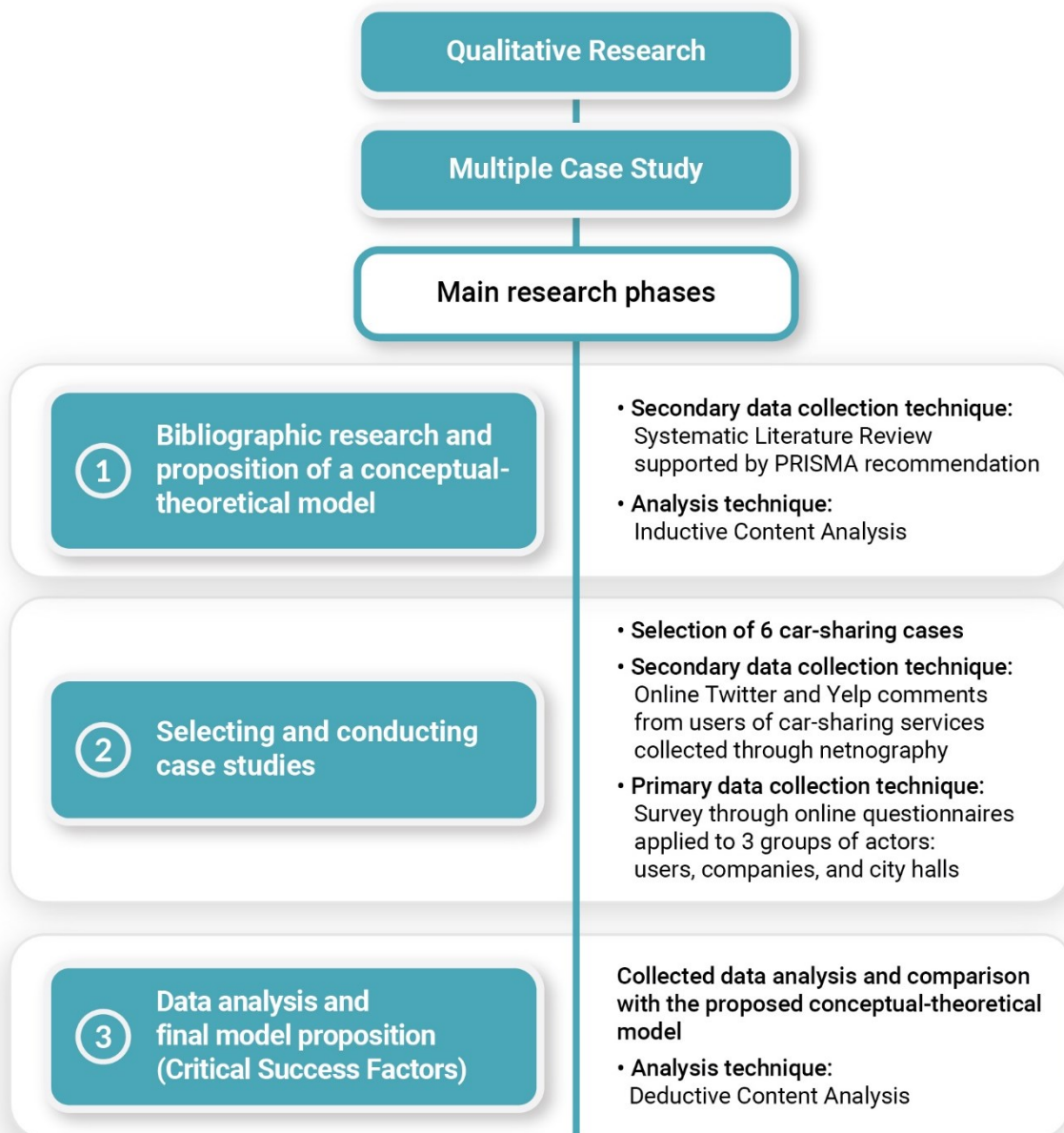
Then, the case studies were conducted, following the recommendations of Yin (2001) and Santos et al. (2018). The selected cases were carsharing services provided by companies to customers (B2C). Cases data consist of secondary data published by users of these services on Twitter and Yelp, collected through netnographic techniques (Kozinets, 2002). In addition, data were also collected

through online questionnaires (Lakatos and Marconi, 2003) applied to three groups of actors in the network of these services: users, companies, and city halls.

Finally, a correlation was performed between the data collected from the cases with the proposed theoretical-conceptual model through deductive content analysis (Bardin, 2011; Elo and Kyngäs, 2008; Erlingsson and Brysiewicz, 2017). After the analysis, it was possible to present the critical success factors that compose the final model.

Figure 3 illustrates a synthesis of these research steps and the description of its main procedures.

Figure 3 – Outline of the main research phases



Source: Own Authorship (2021).

These steps and procedures are detailed in Chapter 3 – RESEARCH METHODS. At last, to conclude this introductory chapter, the following section details the thesis' chapter structure.

1.8 THESIS STRUCTURE

This thesis consists of a structure formed by 5 specific chapters. Chapter 1, which constitutes this introduction, presents the research theme and its delimitation, the research problem, the general and specific objectives, the theoretical and practical justifications, the methodological procedures, the theoretical basis, and the thesis structure, as described in this topic.

Chapter 2 concentrates on the theoretical foundation of the research through a literature review that covers the themes: Sharing Economy, Service Design, Solution-Demand Networks, and Shared Mobility Services. The chapter ends with the thesis theoretical-conceptual alignment.

Chapter 3 details the research methods, with the research characterization and describing the operationalization of the methodological procedures adopted for the complete execution of this study. It also presents the research steps involving the construction of the conceptual-theoretical model, the selection and conduct of case studies with data collection, and the definition of the strategies adopted to analyze these data.

Chapter 4 presents the main results achieved by conducting the case studies and discussing the analysis of data from the conceptual-theoretical structure. The chapter ends with a description of the critical success factors resulting from this research. Finally, Chapter 5 addresses the final considerations of this study regarding the objectives, implications, and limitations of the research and proposals for future studies. The thesis ends with post-textual elements: References, Appendices with complementary materials related to methodological procedures and collection instruments, and Onomastic Index.

2 LITERATURE REVIEW

This chapter presents contributions based on a bibliographical review of the four main topics addressed in this thesis: Sharing Economy, Service Design, Solution-Demand Networks, and Shared Mobility Services. This literature review is subdivided into the following items 2.1 to 2.4. The topics are addressed in the sequence mentioned above to correlate the main concepts discussed. To conclude this chapter, in section 2.5, a conceptual alignment synthesizes this correlation.

2.1 SHARING ECONOMY

This section presents the main elements emerging from the literature review on the sharing economy, emphasizing collaborative consumption and access-based consumption. Therefore, the following subsections address aspects of context, definitions, and terms related to the sharing economy.

2.1.1 Alternative Consumption and Ownership Models

Industrial and post-industrial society, marked by mass production, extensive extraction of natural resources, and high consumption rates, is responsible for materialism and the pursuit of consumption-oriented happiness (Belk, 2007; Vasques, 2015). However, Rifkin (2001), in *The Age of Access*, already indicated possible future trends that would redirect economic activities towards a service-focused society. In this context, product ownership would be replaced by access to them. As a result, consumers would pay for the use of goods and services, reflecting a transition from the materialistic industrial model to a concept of instant access without possession. From this point of view, access is preferable to ownership, as it avoids the costs and inconveniences associated with it and allows access to the benefits of products only for the period in which they would actually be used (Rifkin, 2001).

Stahel (1997) considered essential the transition from an industrial-based economy, with a focus on the commercialization of material goods and consumption of resources, to a functional economy, with a new consumption model centered on services and functions, in which products are seen only as a means to provide the satisfaction of their tasks. The proposal of this functional economy, thus, considered a transition from the product economy (which dominates industrial capitalism) to an economy of useful effects (Huet and Choplin, 2012).

Authors such as Mont (2002) and Stahel (1997) consider that the functional economy is also called the service economy. The central idea is that function, provided by access to a service, is the key to customer satisfaction, not selling the products itself. In this proposal, consumers seek mobility instead of cars, cleaning services instead of more equipment to store in their homes, and integrated products and services to deliver more complete solutions (Mont, 2002).

This integration of product and service offers improves efficiency, leading to positive economic and environmental effects for industry and society (Mont, 2002). Furthermore, based on the life-cycle cost perspective, product and service solutions create incentives to optimize energy and consumables, in addition to prolonging the useful life of a product (Tukker, 2004). Thus, the potential benefits of proposing integrated solutions for products and services have economic, social, and environmental effects, as companies improve their use of resources (Reim, Parida, and Örtqvist, 2015).

The idea of integrating products and services is also present in the concept of product-service systems. For Goedkoop et al. (1999), the authors who introduced the term, these can be understood as a marketable set of products and services, which, when offered together, can completely satisfy users' needs. Thus, it is possible to perceive its relationship with the functional economy proposal, in which the user pays for the use of the solution or the function of the product and not for its possession (Mont, 2002). In these definitions, the issue of commercial transactions is not the delivery of goods or services, but the production of use-value for the consumer, exemplified by the replacement of the sale of a car by the sale of the use of the car (Gidel, Huet, and Bisiaux, 2016).

Mont (2002) defines the idea of product-service systems (PSS) as the sale of the use of a product, rather than the product itself, in a system of products, services, networks of actors, and support infrastructure that seeks to satisfy the consumer

needs and remain competitive, with less impact compared to traditional models. As it originates in the Design field (Vasques, 2015; Vezzoli et al., 2015), the concept of product-service systems will be resumed in section 2.2 SERVICE DESIGN.

The availability of products through their integration with services allowed, in large part, shared access to these goods (Vasques, 2015). Therefore, in addition to an economy focused on accessing products through services or their function (Stahel, 1997), or offers that propose the integration of products and services (Mont, 2002), another emerging form of consumption is the proposal of access to the function of these goods through their shared use (Bardhi and Eckhardt, 2012). This idea is the proposal of the sharing economy, also called collaborative consumption or access-based consumption (Botsman and Rogers, 2010).

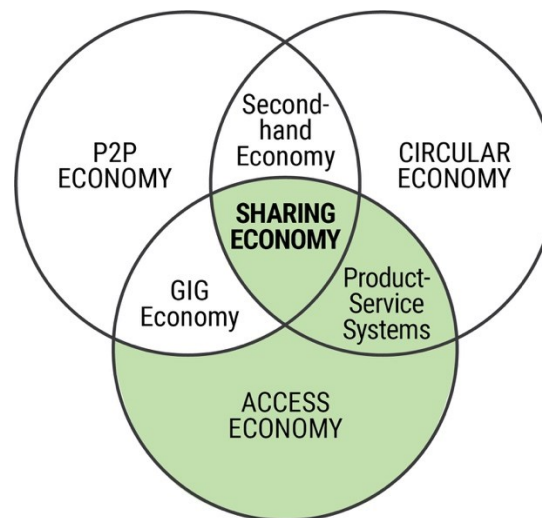
For Somers, Dewit, and Baelus (2018), in the sharing economy, the line that separates products from services is practically non-existent. After all, to offer a product to share or rent often involves hiring a service that allows access to the product. Thus, product-service systems are highly suitable for sharing economy (Somers, Dewit, and Baelus, 2018). For Vasques (2015), the term product-service system comes from the literature on design for sustainability and includes sharing but is not limited to it. Thus, this author understands that there is a relationship between access to a solution through a system of products and services, which can be shared (Vasques, 2015). One frequently mentioned example is carsharing, a model in which individuals move from ownership to access, in a product-service system scheme (Botsman and Rogers, 2010).

For Bostman and Rogers (2010), although hyper-consumption was the dominant market logic in the 20th century, grounded on commercial relationships based on credit, advertising, and the encouragement of individual ownership, the 21st century will be dominated by collaborative consumption, for which the value is in the community, reputation, trust, and shared access (BOSTMAN; ROGERS, 2010). Belk (2014b) considers that the expression that we are what we possess is redirecting to new forms of consumption that do not include ownership, indicating a post-ownership economic model. Therefore, this author suggests the expression “we are what we share,” related to sharing and collaborative consumption practices (Belk, 2014b, p. 1599).

Still, regarding the idea of a sharing economy, Guyader and Piscicelli (2019) consider that this proposal is at the crossroads of three contemporary economic

trends: 1) circular economy; 2) access economy, and 3) peer-to-peer economy (P2P). Figure 4 represents these three trends and their relationships.

Figure 4 – Sharing economy and related terms



Source: adapted from Guyader and Piscicelli (2019).

The circular economy aims to facilitate the recirculation of resources from places where they are no longer wanted or underutilized to new destinations where they are needed and can be used more efficiently, such as artifacts considered second-hand economy (Stahel, 2016). On the other hand, the access economy relates to the idea of product-service systems (Mont, 2002) in which multiple customers sequentially share the use of a good owned by a company, preferring access to the product to their possession (Bardhi and Eckhardt, 2012). Third, the peer-to-peer or P2P economy grounds on the concept that people use digital platforms to organize exchanges of physical products. In these cases, companies, by charging fees for the use of the platform, assume the role of mediators to make it easier, convenient, and reliable for suppliers and consumers to participate in this collaborative consumption, which is also related to the GIG economy (Belk, 2014a; Wilhelms, Henkel, and Falk, 2017). Although these models share common characteristics, and all constitute relevant proposals in the economic, social, and environmental spheres, this thesis focuses on the sharing economy, particularly in aspects related to the access economy and product-service systems (filled areas in Figure 4).

It is clear, therefore, that this described context presents a new panorama. As a result, it is possible to identify the transition from traditional patterns of sale and

ownership to consumption practices aimed at shared use and the proposal of several similar economic models based on the integration of products and services to provide access to the function. Table 3 summarizes the main ideas of these mentioned economic models related to the sharing economy, with the synthesis of its central idea, how are the resources management, and the relationship between the network of actors involved in each of the proposals.

Table 3 – Synthesis of intersections between the main economic models addressed

Type of Economy	Functional economy or service economy	Product-service systems	Collaborative consumption	Access-based consumption	Sharing economy
Main idea	Offer of product's function through services	Offer of complete solutions by integrating products and services	Reinventing traditional usage practices facilitated by online platforms	Accessing products through services rather than possession	Sharing products through services and exchanges
Resources management	Better use of resources	Reduction in the use of resources to produce new products, which are better used	Sequential use of the same product by different users	Reduce the need to own and purchase new goods, emphasizing preference to use only when necessary	Better use and distribution of underutilized resources and products
Actor's network	Value co-creation through actors' interaction	Integrated actors' network	Organized systems or networks	Organized systems or networks	Promote interaction and a sense of community

Source: Own Authorship (2021).

The following sections deepen into aspects of the sharing economy.

2.1.2 The Sharing Economy Context

For Laczko et al. (2019), a sharing economy is often seen as a response to industry inefficiencies deriving from underutilized or idle assets and resources. Guyader and Piscicelli (2019) point out that the emergence of sharing platforms aims to provide economic, social, and environmental benefits, using existing resources more efficiently and reducing waste. For Vasques (2015), the idea of shared use is becoming popular as an alternative to reducing consumption and promoting lifestyle changes. This author points out that between 2007 and 2014, the meaning,

acceptance, and adoption of sharing practices underwent significant changes. There was a considerable increase in products and services offered under the sharing economy concept (Vasques, 2015).

For Li, Taeihagh, and Jong (2018), the last few decades have marked the worldwide adoption of many different innovative technologies, intending to offer more efficient and effective services. In this context, the sharing economy is an example. Also called “collaborative consumption” or “peer production economy,” it can be defined as any market that brings together individuals to share or exchange otherwise underutilized assets (Li, Taeihagh, and Jong, 2018, p.3, our translation). The sharing economy allows customers to interact with service providers through innovative technologies in the most varied segments such as transportation, accommodation, and consumer goods. The sharing economy in recent years has received substantial attention because its business model has disrupted many traditional industries, changing the way supply and demand are compared in real-time. People are willing to pay for temporary access to a product rather than purchasing and owning it (Somers, Dewit, and Baelus, 2018).

The idea of the sharing economy can be traced back to earlier times, in sharing among family and close friends (Belk, 2014b). However, in the early 2000s, in response to the growing concern with the restrictions of natural resources, the Internet and the online world began to increase efficiency in resources management (Botsman and Rogers, 2010). For Zhang, Jahromi, and Kizildag (2018), since 2008, when the term sharing economy was first introduced, this innovative peer-to-peer business model has grown fastly. Airbnb, a sharing platform in the accommodation sector, and Uber, a ride-hailing company, are some of the best known and most discussed examples of this phenomenon, both in the popular press and academic publications (Laczko et al., 2019).

For Silva (2019), the idea of sharing products and services has become a global trend, gaining relevance both for its followers and researchers. For Botsman and Rogers (2010), collaborative consumption was not just a niche trend but a large-scale one, involving millions of users and constituting a profitable alternative for investment by many companies. Zhang, Jahromi, and Kizildag (2018) point out that the sharing economy has a growing orientation in consumer behavior, changing how products and services are provided and consumed. It is also a new competitive business model that presents challenges for conventional service providers. For

Botsman and Rogers (2010), the participation of companies in the sharing economy would be increasing. This growth is fueled mainly by changing consumption patterns and the advancement of technology-enabled platforms (Laczko et al., 2019). As a result, the sharing economy is one of today's fastest growing and most innovative segments (Ta, Esper, and Hofer, 2018).

In addition to new companies and businesses that emerged with the growth of the sharing economy, conventional service providers have started to incorporate sharing services into their product lines to diversify and respond to this new trend. An example is the traditional car rental companies, which have expanded their niche by acquiring companies that offer carsharing services (Möhlmann, 2015).

2.1.3 Definitions and Terms related to the Sharing Economy

The sharing economy, being a recent and emerging term, does not have an established consensus of definition, and it is almost impossible to reach a solid concept (Somers, Dewit, and Baelus, 2018). For Vasques (2015), even with its popularity and dissemination, the term sharing itself and its practices require a common definition between theorists, and several authors point to the existence of a plurality of related terms (Acquier, Carbone, and Massé, 2019; Kumar, Lahiri, and Dogan, 2018; Vasques, 2015)

Among the various terms used as synonyms, the most mentioned are sharing economy, collaborative consumption, and peer economy (Silva, 2019; Cheng, 2016). Hu (2019, p. 281) also points out the use of the terms “access” or “access-bases consumption” and “product-service systems.” These terms have numerous definitions, and their limits are confusing (Murillo, Buckland, and Val, 2017), but they share the general idea of describing the shared access to underutilized goods and services, prioritizing use and access over ownership (Cheng, 2016).

Among the main aspects considered in the continuous effort to define what characterizes the sharing economy and what does not (Belk, 2014a; Cheng, 2016), these are the central discussion points:

- 1) The target audience segments, with business models that can be aimed at peer sharing (peer-to-peer - P2P or customer-to-customer - C2C), from companies to customers (business-to-peer or business-to-customer - B2C) or both.
- 2) The orientation that can be profit-oriented or not-for-profit.
- 3) Activities considered or not as sharing practices, such as rent, exchanges, loans, donations.
- 4) The relevance of the relationship between the actors involved and the presence of digital platforms to mediate these relationships.

Thus, based on these four points, some of the main definitions associated with the sharing economy are identified and summarized in Table 4.

Table 4 – Main definitions of terms associated with the sharing economy

Related terms	Author(s)	Definition	Target audience	Profit x No profit	Related activities
To share	Belk (2007)	The act and process of distributing something that is ours for the use of others, and the act and process of receiving or taking something from others for our use. Alternative form of distribution that lies between exchanging goods and making donations or offering gifts. By sharing, two or more people can share the benefits and costs of owning a good. Instead of distinguishing what is mine and yours, sharing defines something as ours.	P2P	This concept does not consider financial compensation	It includes voluntary loans, membership and resource allocation, and authorized use of public property, but does not consider contractual renting, leasing, or unauthorized use of property through theft or trespass.
Pseudo-sharing	Belk (2014a)	Many of the apparent cases of sharing are characterized as pseudo-sharing – the traditional exchange of goods just using the sharing vocabulary. For this author, pseudo-sharing and collaborative consumption are synonymous.	P2P B2P B2B	For-profit purposes, lack of community feelings and no expectations of reciprocity	1. Long-term rental and leasing 2. Short term rental 3. Websites that “share” data online (social networks) 4. Websites that facilitate Exchanges.
Shared use	Vasques (2015)	Access to products and services rather than private ownership. Possession can be of an individual, group or company, but the product circulates for use by different people within a group with the potential to connect people. They refer to “common use”, but cannot be considered public, as they are hybrids between public and private.	P2P B2P B2B	For-profit or non-profit	Sharing, distributing, alternating the use of the same product with several people, as opposed to individual use.
Sharing economy	Botsman and Rogers (2010)	New business models that exploit unused or underutilized resources, replacing ownership with product access. A means of sharing goods, services, ideas, information, and skills across a network of individuals, facilitated by social networks through computers and mobile applications.	B2B, B2P	For-profit or non-profit	Emerging socioeconomic model based on sharing, renting, donating, exchanging, and borrowing goods and/or services.
Sharing economy	Hamari, Sjöklint, and Ukkonen (2015)	The interpersonal activity of obtaining, giving, or sharing access to goods and services coordinated by online technology platforms and services. They facilitate peer interactions and support the co-creation of value from the untapped potential of assets that are underutilized by owners.	P2P	For-profit or non-profit	Peer-to-Peer (P2P) activity of obtaining, giving, or sharing access to goods and services.
Sharing economy	Muñoz and Cohen (2017)	A socioeconomic system that allows for an intermediary set of exchanges of goods and services between individuals and organizations that aim to increase efficiency and optimize underutilized resources in society.	P2P B2P B2B	For-profit or non-profit	Intermediate set of exchanges of goods and services between individuals and organizations.

Related terms	Author(s)	Definition	Target audience	Profit x No profit	Related activities
Sharing economy	Kumar, Lahiri, and Dogan (2018)	Monetization of underutilized assets belonging to service providers (companies or individuals) through short-term leasing.	P2P B2B B2P	For profit (Economic incentive)	Short term rental.
Collaborative consumption	Belk (2014a)	People and organizations that coordinate the acquisition and distribution of a resource for a fee or other compensation, including non-cash payment. It's a half-term between sharing and market exchange, with elements of both.	P2P e B2P	For-profit or non-profit	Acquisition and distribution of a resource for a fee or other compensation, including market exchanges, barter, rentals, and exchanges of goods or services for others.
Collaborative consumption	Möhlmann (2015)	Collaborative consumption takes place in organized systems or networks. For example, participants share rent, loans, exchange of goods, services, transport solutions, space, or money, facilitated by an external provider such as an online platform.	B2C P2P	For-profit or non-profit	Sharing activities in the form of renting, borrowing, exchanging goods, services, transport solutions, space, or money.
Collaborative consumption Access-based economy	Botsman and Rogers (2010)	Reinventing traditional market behaviors such as renting, borrowing, bartering, sharing, donating, facilitated by the Internet and online platforms, as an antidote to overproduction and excessive consumption. Activity that allows you to realize the benefits of accessing products and services instead of ownership while saving money, space, and time and enabling social interaction.	B2B, B2P e P2P	For-profit or non-profit	Three types of distinct systems: 1. Redistribution Markets: recycling, remanufacturing, and resale of used products 2. Collaborative Lifestyles: conscious consumption, belief in the common good, and trust in strangers 3. Product and Service Systems: product rental and sharing services.
Access-based consumption or Access-based services	Bardhi and Eckhardt (2012)	A subset of the sharing economy, in which transactions can be mediated by the market, but property transfer does not occur. Consumers prefer a premium price for the experience of accessing goods temporarily to eliminate issues such as costs, space constraints, pollution, and wasted resources.	B2P, P2P	For-profit or non-profit	Organized systems or networks in which participants carry out sharing activities in the form of renting, borrowing, exchanging goods, services and transport, space or money solutions.

Source: Own Authorship (2021).

Among the concepts presented, the closest to the objectives and focus of this research are collaborative consumption and access-based consumption when considering the offer of products through services. However, the idea of shared use is also related, since access to a product can be shared, even if sequential (with more people using the same product instead of just one person using the product) and owned by a company, in which the user does not need to purchase the product to enjoy the benefits of its function. Thus, both profit-oriented and non-profit businesses are considered valid (Henten and Windekilde, 2016), in addition to the sharing that occurs between peers (P2P), between companies (B2B), and between business and customers (B2C).

2.1.4 Collaborative Consumption and Access-Based Consumption

For Belk (2014a), the sharing economy originates from collaborative consumption, understood as people who coordinate the acquisition and distribution of resources for a fee or other form of compensation, covering, in addition to traditional market exchanges, swaps, and exchanges of products or services that involve non-cash payment. Thus, the terrain that collaborative consumption occupies is a middle ground between market sharing and market exchange, with elements of both (Belk, 2014a).

Bostman and Rogers (2010), authors who coined the term collaborative consumption, define it as the reinvention of traditional market behaviors such as rent, loans, exchanges, sharing, donations facilitated by the Internet. For example, it can be seen in the proliferation of various online platforms that allow people to rent a car by the hour or share their guest room with strangers, as an antidote to overproduction and overconsumption. These activities allow people to realize the benefits of accessing products and services instead of their possession while saving resources, space, and time, and allowing social interaction. For these authors (BOSTMAN; ROGERS, 2010), collaborative consumption is divided into three types of distinct systems:

- 1) Redistribution markets, which include recycling, remanufacturing, and second-hand resale practices.

- 2) Collaborative lifestyles encompassing conscious consumption practices, belief in the common good, and trust in strangers.
- 3) Product-service systems, which include product rental and sharing services practices.

Möhlmann (2015) considers that collaborative consumption occurs in organized systems or networks. Participants carry out sharing activities in the form of rent, loans, exchange of goods, services, transport solutions, space, or money, facilitated by an external provider as an online platform. Thus, on the one hand, collaborative consumption can refer to business-to-customer (B2C) services, such as car sharing. On the other hand, it can refer to peer-to-peer sharing (P2P) in the form of redistribution markets or collaborative lifestyles, such as accommodation-sharing markets, often facilitated by an external provider as an online platform (Möhlmann, 2015).

Based on the definition of Bostman and Rogers (2010), Vasques (2015) points out that the concept of collaborative consumption contributes to the definition of the sharing economy, such as belief in the common good, collective thinking, and trust in strangers. However, this author considers that the terms cannot be taken as synonyms since collaborative consumption considers resale and redistribution practices, with linear interactions, which do not fit into practices to strengthen social cohesion. Henten and Windekilde (2016), on the other hand, point out that this definition of collaborative consumption is related to commercial versions of sharing and to meanings that consider financial transactions and profit-making purposes. Nevertheless, despite the differences, there are two similarities between sharing and collaborative consumption practices: (i) the use of non-ownership and temporary access models in the use of goods and services and (ii) dependence on the Internet and, mainly, the Web 2.0, which allows this access (Vasques, 2015).

Li et al. (2019) consider that the idea of promoting access to a product instead of its possession can be understood as a type of access-based consumption within the concept of a sharing economy. Bardhi and Eckhardt (2012) present the concept of access-based consumption as a subset of the sharing economy, in which transactions can be mediated by the market, but property transfer does not occur. Consumers are willing to pay a premium price for accessing and using an asset; these transactions take place in the private, public, and non-profit sectors. Instead of

buying and owning products, consumers want access to goods. They prefer to pay for the experience of accessing them temporarily to eliminate issues such as costs, space constraints, pollution, and wasted resources. These are systems or organized networks in which participants carry out sharing activities in the form of short-term rent, loans, exchange of goods and services for transport solutions, for example (Bardhi and Eckhardt, 2012).

It is noticeable that several definitions mentioned previously, such as those by Botsman and Rogers (2010) and Hamari, Sjöklint, and Ukkonen (2015), consider that the access to shared use of the function was largely possible by the development of platforms and mobile devices connected to the Internet. These devices intermediate the process between those who make the offer and those looking for the function through shared use. Therefore, technology is an essential element in using and disseminating sharing practices, collaborative consumption, and access-based use.

2.1.5 Characteristics of the Sharing Economy: Web 2.0 and Sustainability

According to Belk (2014b), although practices related to sharing goods and services such as lending, giving, exchanging, or renting are old, the phenomenon of sharing economy and collaborative consumption was only made possible by digital technologies. Belk (2014a) mentions the concept of Web 2.0, a term used to designate the idea of the Internet network as a social platform (Web as a Platform or Social Web), referring to websites that allow users to contribute with content and be able to connect. This concept is used to differentiate an earlier period when virtual pages were static and online interaction was only through the exchange of emails. For Belk (2010), the Internet inaugurated a new era of sharing.

Vasques (2015) also mentions that Web 2.0 was central to propel the Sharing Economy, as it highlights economic and technological changes and mainly a shift in the relationship between individuals and objects. Zhang, Gu, and Jahromi (2019) state that since its emergence in 2008, the sharing economy has experienced rapid growth due to the accelerating society of social media and changing social needs. This economy typically has two types of environments for social value: online

platforms and real-world settings. For Hamari, Sjöklint, and Ukkonen (2015), online sharing platforms are a means of social commerce, which is a peer-to-peer interaction tool, motivating users to continue using the sharing economy.

For Möhlmann (2015), the idea of collaborative consumption is spreading to areas previously non-collaborative due to social, economic, and technological factors. Several authors (Ambrosino et al., 2016b; Belk, 2014a; Chang and Wang, 2018; Henten and Windekilde, 2016; Ritter and Schanz, 2019) point out that the rise of the Internet played a key role in this process, by facilitating the constitution of communities and online networks, with low transaction costs, and the use of mobile applications that allow an even more instantaneous exchange of information. In addition, the development of online peer-to-peer platforms has facilitated communication, interaction, and transactions between service users (Möhlmann, 2015).

The Internet has facilitated sharing practices by allowing companies to unlock commercial value that was previously unexplored (Casprini, Minin, and Paraboschi, 2019), and the advent and diffusion of new information and communication technologies have allowed them to transform social customs into business opportunities (Acquier, Carbone, and Massé, 2019), creating new markets. These companies introduced a new paradigm, with new regulations and a tangible impact on people's lives (Casprini, Minin, and Paraboschi, 2019).

Therefore, technological development is relevant for disseminating collaborative consumption practices, such as the advancement of Web 2.0, applications for mobile devices, and digital platforms, which are non-human actors with a relevant role in the network (Callon, 1986). Table 5 summarizes the main benefits that this non-human actor represents for greater acceptance and use of practices related to this new economic model.

Table 5 – Benefits of digital platforms for sharing economy practices

Benefits	Authors
Better communication and interaction between suppliers/providers and consumers	Belk, (2014a); Hamari, Sjöklint and Ukkonen (2015); Henten and Windekilde (2016); Möhlmann, 2015; Zhang, Gu, and Jahromi (2019)
New market and performance possibilities	Acquier, Carbone, and Massé (2019); Casprini, Minin, and Paraboschi (2019)
Reduced transaction operating costs	Henten and Windekilde (2016); Ritter and Schanz (2019)
Reduction of trust and reputation barriers that previously inhibited sharing practices	Henten and Windekilde (2016); Ritter and Schanz (2019)
Improvement in the users' own assessment of the quality of services	Ambrosino et al. (2016b); Chang and Wang (2018)

Source: Own Authorship (2021).

In addition to the relationship with digital platforms, another striking feature of these types of economy is their relationship with sustainability and a more significant concern with a conscientious use of resources. Acquier, Carbone, and Massé (2019) consider that the sharing economy has emerged as a popular label to refer to different initiatives that connect individuals through platforms to make sales, rent, exchanges, or donations, or establish more centralized product-service systems to provide access rather than use, intensifying the use of idle assets (Botsman and Rogers, 2010). Hu (2019) states that the sharing economy has specific characteristics, such as sustainability, openness, and solidarity, driven by sharing underutilized assets and resources, allowing people to connect by sharing homes, skills, and cars. Zuo et al. (2019) highlight characteristics such as promoting the efficient circulation of idle resources between different individuals, effectively improving the efficiency of allocating social resources, and reflecting the concept of green and more conscious consumption.

Nevertheless, there are controversies and different opinions on sustainability in the sharing economy and product-service systems models and their social impacts. For Acquier, Carbone, and Massé (2019), the hybrid nature of the shared economy triggers controversial debates about the pursuit of social and environmental goals. In this perspective, the rhetoric of “feeling good” when sharing constitutes a form of mystification that hides the actual impacts of the sharing economy. Furthermore, studies have shown that the environmental benefits of the sharing economy can be overestimated, as economic motivations generally prevail over environmental concerns in user motivations (Acquier, Carbone, and Massé, 2019).

For Bisiaux et al. (2014), the functional economy is seen as a service economy that allows environmental improvements, but the relationship with environmental issues is not always clear. For these authors, the environmental dimension is considered a consequence of the functional economy, not a prerequisite (Bisiaux et al., 2014). Ecodesign proposals can be seen as gradual and intermediate models, still centered on material goods, but with environmental approaches, which work as a transition to strategies centered on selling functions and use-values. Gidel, Huet, and Bisiaux (2016) consider that the association of these aspects is promising for sustainable innovation, in which Ecodesign practices work as tools for a new business model centered on use-value. Other studies show that car sharing, for example, can generate beneficial effects on the city and the environment when combined with different modes of ecological transport (public transport, bicycles, and walking). Therefore, the proposals of the sharing economy and product-service systems have a potential for sustainability, but this concern must be by design in new solutions since the relationship and benefits are not always direct.

The growth of these new economic models resulted in the creation of countless businesses. The most commented segments in the literature are accommodation, mobility, and transport, which are described next.

2.1.6 Main Examples: Accommodation and Mobility Segments

Airbnb, in the accommodation sector, and Uber, in the transport sector, are considered successful examples of platforms established in the last 5 to 10 years and seen as examples of the emergence of a sharing economy (Hamari, Sjöklint, and Ukkonen, 2015). The State of California, in the United States, is considered the cradle of the sharing economy, as it is the headquarters of these companies and many others related to technology platforms (Henten and Windekilde, 2016).

In recent years, more people have embraced carsharing services like Car2Go or Zipcar, bike sharing like CitiBike in New York, swapping books or DVDs on Craigslist, or booking accommodations in online community markets like Airbnb (Möhlmann, 2015). Presenting some quantitative data, Möhlmann (2015) highlights that bike sharing represents the fastest growing trend in transport, with around

400,000 public bicycles available worldwide in 2012. Furthermore, in 2014, Airbnb already offered temporary spaces such as apartments, castles, or houseboats in more than 34,000 cities in 192 countries. By 2016, the carsharing market in North America was already estimated at US\$3.3 billion (Möhlmann, 2015).

Lagadic, Verloes, and Louvet (2019) point out that in the 20th century, private ownership of a car was considered a social marker and a necessary step towards adulthood. Currently, this paradigm is being challenged: the sharing of products allows for cost savings by users, but also the extraction of profits by service providers, as it generates revenue with a good that has never been traded before: minutes and hours of downtime resulting from underutilization of privately owned cars (Shaheen and Chan, 2016). Thus, shared Demand Responsive Transport (DRT) services can be considered a tool to shift from a culture in which consumers own assets (cars) to a culture of Mobility as a Service (MaaS), in which consumers share access to assets (Ambrosino et al., 2016a).

Shaheen and Chan (2016) and Alemi et al. (2018) state that transport is changing at an accelerated pace. Information and communication technologies, which, among other functions, facilitate the availability of local data apps on smartphones, offer unique opportunities for the introduction and widespread deployment of new transport services, such as car and ridesharing, bike sharing among others.

These shared mobility services merge the advantages of mobile communications and instant booking mechanisms with the principles of sharing economy, supported by Internet platforms and smartphone applications, and enable access to various daily mobility options, especially in urban environments. In doing so, they separate access to transport services from the fixed costs of car ownership and offer cheaper options for individual car ownership (Miramontes et al., 2017). In addition, these technology-enabled services can affect travel behavior in various ways, increasing the number of options available, reducing travel uncertainty, and potentially replacing the use of other modes of transport (Alemi et al., 2018).

Belk (2014a) states that auto companies are facilitating short-term rental incentive practices rather than car ownership. One reason is that young people are losing interest in car ownership as crucial to their self-definition. Examples are the emerging and increasingly common carsharing companies and even the large automakers that are investing in this segment. Examples are Avis Group,

consolidated in the car rental market in the United States, which acquired Zipcar, a carsharing company. Others are the carsharing Car2Go by Mercedes and DriveNow by BMW.

In the mobility sector, in addition to carsharing companies, other independent companies have emerged through applications or paid ride services such as Uber, Lyft, Sidecar, Blablacar, and many others (Ambrosino et al., 2016b). The spread of these companies resulted in a new segment of shared mobility services. Some of the main modes are carsharing, bike sharing, scooter-sharing, and ridesharing, which will be further discussed in section 2.4 SHARED MOBILITY SERVICE NETWORKS.

One of the factors that enabled the increase of these shared mobility services was the rating and reputation systems, also made possible by digital platforms, as they helped reduce the distrust of free rides with strangers. In addition, the possibility of including comments, photos, and videos of people and cars to be shared or consumed collaboratively helps build a reputation economy, making transactions between strangers safer and less uncertain (Ambrosino et al., 2016b).

In the context of sharing economy, functional economy, and product-service systems, shared mobility services present specific business models. It is possible to identify certain patterns and user profiles, which are discussed below.

2.1.7 Business Models and User Profile

Cheng (2016) points out that some of the early practices of the sharing economy were non-profit initiatives, as in the cases of Couchsurfing (Internet hosting service) and Freecycle (network for exchanging goods at a local level), but that gradually grew in a large business model, assuming a fraction of the sharing fee, as in the cases of Uber and Airbnb (Belk, 2014a). For Zuo et al. (2019), these initiatives are considered new business models, ranging from accommodation to transport, finance, and online labor markets (Hu, 2019).

Sharing platforms can be classified into for-profit or non-profit activities. A profit motive is understood as market-mediated business models that use pricing mechanisms and feed revenue streams to their employees through monetary

incentives. On the other hand, a non-profit motive is discussed as community-driven business models, fueled by ecological or social missions (Hu, 2019).

Another dimension classifies activities according to the audience they are aimed at (Hu, 2019). Thus, some companies provide products for shared use by people and consumers, called business-to-customer (B2C) or business-to-peer (B2P). This is also the case for product-service systems. Examples are carsharing services such as Zipcar, in which the vehicle remains owned by the company, which makes them available for shared use by its users. There are also sharing platforms between people or distribution markets, in which consumers make available and use products among themselves, called peer-to-peer (P2P) or customer-to-customer (C2C). Access is gained through the collaborative lifestyle, where people share similar interests and contribute with less tangible assets such as space or time. However, in this case, some companies operate the intermediation of the platform, although the sharing relationship is between people, as in the cases of Blablacar and Airbnb (Belk, 2014a).

Also, for Kumar, Lahiri, and Dogan (2018), the sharing economy has a unique business model that maximizes the use of idle assets. While a higher occupancy of any asset will increase its productivity, it will also reduce its useful life, which should also be considered a cost. Furthermore, the risks associated with participating in the sharing economy are more significant than conventional markets for suppliers and consumers.

Zhang, Jahromi, and Kizildag (2018) state that prices are defined according to the customer's perception of economic value, the maximum price that customers are willing to pay. However, the concept of economic value can also be defined as the difference between the benefits and sacrifices perceived by customers. This interpretation is related to the business offer, which combines the benefits that customers receive from companies, including economic gains, technical support, service benefits, and social advantages so that the offer is considered a value carrier. Therefore, it is recommended that companies focus on a value-based pricing strategy to gain a competitive advantage, in addition to researching and getting to know their audience's profile well (Zhang, Jahromi, and Kizildag, 2018).

Different authors (Hu, 2019; Möhlmann, 2015; Kumar, Lahiri, and Dogan, 2018) point out that in demographic surveys applied to consumers of the sharing economy and collaborative consumption services, the 25-39 age group is the most

representative, besides being the most informed about these business models. Profiles identified also include that people with higher education levels are more likely to be interested in the sharing economy, either providers or consumers. Higher income also correlates with participation in these models.

Kumar, Lahiri, and Dogan (2018) suggest that the very emergence of these new business models is also attributed to the ever-changing needs of technology-savvy young generations such as Generation Y, known as millennials, which is a vast and powerful segment that values mobility and renounces ownership (Vasques, 2015). The acceptance of new economic models by this public can be due to behavior change concerning possessions, perceived, for example, by the fact that many young people no longer show an interest in acquiring a vehicle, something previously related to social status (Belk, 2014a). Members of this generation prefer experimental employment that does not impede their freedom and mobility, as they want to travel and experience different cultures, jobs, and places. Unlike their predecessors, Generations X and Baby Boomers, they are not as attached to their assets as cars or houses. They prefer to rent than own due to mobility and economic restrictions (Kumar, Lahiri, and Dogan, 2018).

The millennials generation also stands out for their appreciation of practical attributes, such as efficiency, ease, convenience, and immediate gratification. As they have lived with technology for a longer time, they are used to choosing from a series of options made possible by the Internet. Service enablers in the sharing economy have taken advantage of these qualities by eliminating bureaucracy, creating user-friendly applications, and providing services at an accelerated pace, which can be summarized as ease of use (Kumar, Lahiri, and Dogan, 2018).

One of the most used and widely cited tools for creating a business model in this context is the Business Model Canvas by Osterwalder and Pigneur (2010), which has proven its strength as a basis for conceptualizing business innovations in sustainability. The nine-building blocks of this tool are generally aggregated into three main components: (i) value proposition, (ii) value creation and delivery, and (iii) value capture, which are essential for the shared economy business model. This allows the exchange of value by successfully combining time and monetary assets. Specifically, it saves time for customers for convenience, generates economic value for service providers that offer their assets, and provides service facilitators with time and

money. In addition, increasing competition in various markets means that customer behavior is more value-oriented (Kumar, Lahiri, and Dogan, 2018).

2.1.8 Relationship between Actors and Value Co-creation in the Sharing Economy

For Zhang, Gu, and Jahromi (2019), the sharing economy is a socio-economic phenomenon based on sharing human and non-human resources, which involves the collaborative creation, production, distribution, and consumption of products and services. Vasques (2015) considers the services of the sharing economy as relational, since the emphasis is on the interpersonal relationship made possible, and it is in social relationships that the sharing culture takes root, regardless of the economic situation and technology (Vasques, 2015). Customer value is identified as a keyword to understand the success of innovative and entrepreneurial ventures in the shared economy (Zhang, Gu, and Jahromi, 2019). However, as research on the sharing economy is still in its infancy, its relationship with the concept of customer value has not been further investigated (Hamari, Sjöklint, and Ukkonen, 2015).

Zuo et al. (2019) claim that sharing economy platforms establish a connection between service providers and recipients of these services through Internet technology, thus reducing the cost of sharing transactions, establishing trust mechanisms in various ways, and making this model more sustainable. For Acquier, Carbone, and Massé (2019), by combining environmental concerns, optimizing resources, orientation towards communities and social exchanges, and pointing to market opportunities, the sharing economy offers broad promises in terms of sustainability and creation of shared value. This involves creating economic value that also creates value for society by addressing its needs and challenges. Thus, the sharing economy creates value by providing access and intensifying the use of underutilized assets through a set of initiatives that increase the availability and efficiency of underutilized resources in society, organizing exchanges between peers or promoting access to the property, or both (Acquier, Carbone, and Massé, 2019).

Value creation is also essential to understanding the barriers and motivations for sharing. The literature on sharing economy models and product-service systems

points to different obstacles that can impede or limit consumer acceptance to adopt shared or collaborative use practices. Understanding these limitations can be critical to tailoring offers to attract more consumers and help overcome their fears.

2.1.9 Barriers to Shared Use

Among some of the main barriers that can hinder shared use, Tukker (2004) mentions the change and adaptation to new consumption habits, as it is necessary to spend more effort and time to be able to use the product because it is not always available at the time one wishes to use it. Unavailability and possessiveness concerning products considered essential or of greater purchasing value, even if little used, are also pointed out by Tukker (2004) as limitations to shared use. Practical and functional aspects are also pointed out by Möhlmann (2015) as inhibitors to the use of collaborative consumption models. Vasques (2015) reports that in some cases of refusal to share products, the main barriers can be the fear of possible damage caused by other people, in addition to the risks of not getting the product back, as well as extra charges with displacement (Vasques, 2015).

Regarding the replacement of product purchase for their use by product-service systems, Catulli (2012) points out that consumers are often suspicious of how "packages" are presented to them, as they may think they are an excuse to charge more money, and therefore prefer the safety of tangible products. Vezzoli et al. (2015) point out people's difficulties accepting the Product-Service Systems (PSS) as a mode of consumption due to the insecurity of what they are receiving and the uncertainty that the provision will be delivered according to their needs. This insecurity also has to do with consumers' mental accounting of how much will be spent using the service. Consumers seem to have difficulty evaluating the costs of a particular product over its life cycle and deciding which type of provision is the most advantageous between buying and renting, as they use different criteria to compare the prices of products and services. However, the costs incurred during the life cycle of some products are generally much higher than their initial investment (Catulli, 2012).

Vasques (2015) points out other impediments identified by companies inserted in the context of PSS and sharing. Among them, the difficulty in showing, translating, and exposing to the public what the business model is, what advantages and benefits the service offers, in addition to the public's lack of knowledge about how the business works stand out. For example, in the carsharing industry, many people still think that owning a car is freedom when, in fact, it's the opposite. The main advantage is paying only for the time the vehicle is actually used, not during idle time (Vasques, 2015). Merfeld et al. (2019) also raise the barrier to change the car's role from personal to shared space.

In addition, Bardhi and Eckhardt (2012) emphasize the limitation of shared use just to experience the novelty, which results in a lack of connection and consumer loyalty. As there is no purchase of products, consumers are more interested in experimenting than committing, which mitigates the possibility of creating loyalty with specific brands. Vasques (2015) comments that this is a tough field, as conquering the critical mass to maintain the platform is a challenge because most people are not yet ready to share in this type of service (Vasques, 2015).

Therefore, structuring businesses aimed at shared use and that favor collaborative access to product functions brings challenges in terms of customer loyalty. In addition, each product has specific features to be shared, just as each sociocultural context will imply a greater or lesser appreciation of these aspects (Vasques, 2015). Therefore, it is vital to think about ways to create value and attract consumers, also finding factors that motivate its use.

2.1.10 Motivations and Facilitators of Access to the Shared Use of Function

For Hu (2019), the factors that contribute to the development of the sharing economy must be researched and studied. In general, one of the most significant is the development of the Internet, particularly the launch of Web 2.0 (Belk, 2014a; Vasques, 2015), which allows the development of online communities and networks with low transaction costs. Second, with changing consumer behavior, temporary use of products is more attractive than ownership. Finally, with growing environmental awareness, cities are struggling with population growth and density. Thus, there is

also an urgent need to address serious pollution problems by promoting car and bike sharing initiatives. Consumers are making conscious choices in favor of goods with less environmental impact (Hu, 2019).

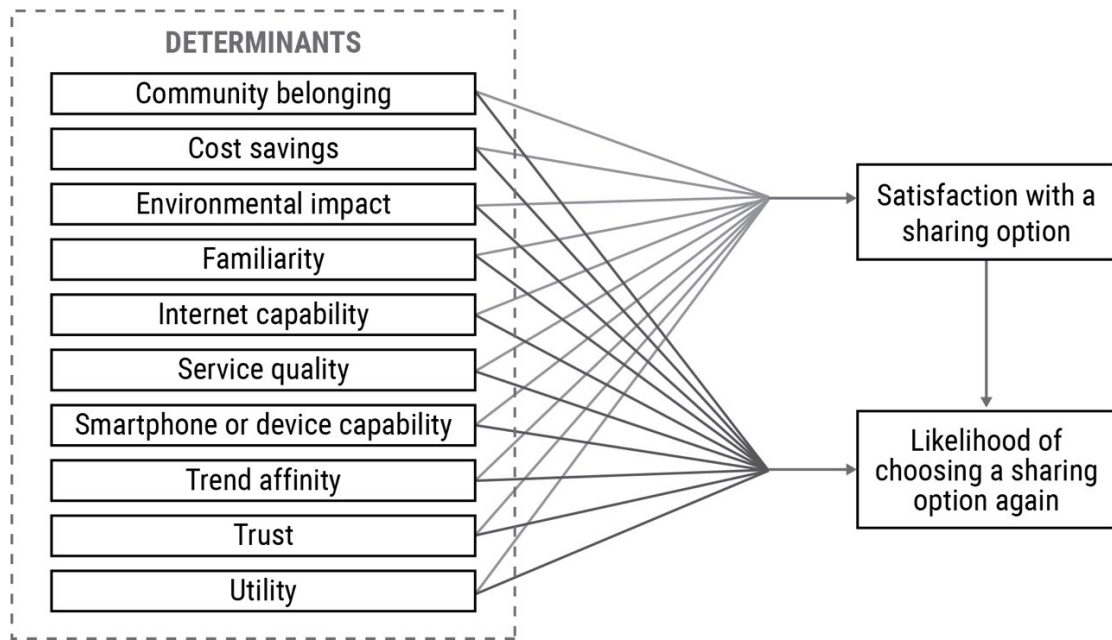
Somers, Dewit, and Baelus (2018) consider four significant motivational factors in the sharing economy concept: two intrinsic and two extrinsic. Intrinsic motivations consider (1) satisfaction and (2) sustainability. Extrinsic motivations include (3) economic gains, (4) and reputation.

Vasques (2015), when developing research with business entrepreneurs focused on shared and collaborative use, identified that one of the motivations related to the offer of shared product services, both for those who provide the service and for those who use it, is the economic aspect, by the reduction of costs or by the possibility of monetary return with these services, followed by environmental values and, to a lesser extent, social. In turn, Murillo, Buckland, and Val (2017) state that price, convenience, and brand are the three most significant factors in choosing a collaborative economy option.

Zhang, Gu, and Jahromi (2019) consider the categories of social, economic, and technological factors as drivers for sharing. The social aspects consist of increasing population density, the drive for sustainability, the desire for communication, and generational altruism. Idle resources, financial flexibility, access to the property, and the flow of venture capital funding are the economic factors, while social networks, mobile devices, and payment systems are the technological factors that rapidly drive the sharing economy (Zhang, Gu, and Jahromi, 2019).

Möhlmann (2015) surveyed the determinants of satisfaction when using a sharing option and the probability of returning to this service. In the study, the author found ten main determining factors, illustrated in Figure 5: (1) Community belonging, (2) Cost savings, (3) Environmental impact, (4) Familiarity, (5) Internet capability, (6) Service quality, (7) Smartphone or device capability, (8) Trend affinity, (9) Trust and (10) Utility.

Figure 5 – Determinants of satisfaction in collaborative consumption



Source: adapted from Möhlmann (2015).

Möhlmann (2015) states that research has emphasized the emerging role of collective and community co-production in consumption behavior, thus considering the participation of a group or community as determinants for the practice of sharing activities or collaborative consumption. Furthermore, curiosity is widely proposed as one of the influencing factors in the motivation of individuals to use a shared economy platform (Cheng, Fu, and Vreede, 2018). Mont (2002) argues that user satisfaction with carsharing systems can be influenced by cost savings, including the initial cost of investing in a transport option. Bardhi and Eckhardt (2012) also emphasize that economic concerns are one of the main reasons in many cases for collaborative consumption.

Möhlmann (2015) also highlights practical factors related to the functionality of sharing services. For example, familiarity with a sharing option is also relevant. Some consumers may be reluctant to use a service for the first time because they have no experience with it. Thus, familiarity can be a relevant determinant of satisfaction and reuse. Likewise, the ability of users to communicate via the Internet can be a key factor not only for the satisfaction with the sharing of services but also for the subsequent use of these services, which is also related to another factor which is the smartphone capacity, which, through apps, become an important factor in facilitating the use of shared services such as carsharing.

Trust in services is also relevant. In the context of collaborative consumption, trust refers simultaneously to trust in the provider of a service and in the other consumers with whom a product is being shared. Thus, trust is considered a determining principle in choosing collaborative consumption options (Botsman and Rogers, 2010). Finally, utility is the last determining factor considered, as it relates to the functionality offered by shared products and services and how they meet the functional needs sought by consumers (Möhlmann, 2015).

After surveying these ten factors, illustrated in Figure 5, Möhlmann (2015) identified that the most relevant were the rational determinants. Sustainability is not directly associated with participation unless, at the same time, it is also related to other positive attitudes towards the sharing economy. Practical aspects such as cost savings, familiarity, service quality, trust, and usefulness had the greatest influence on the level of satisfaction when using a sharing option, in addition to contributing to the return to the use of these practices (Möhlmann, 2015).

Regarding these functional aspects, Zhang, Gu, and Jahromi (2019) also identified that costs, communication, and convenience are the three main factors that create value in the phenomenon of the sharing economy. Customers perceive various aspects of technical values. Specifically, participants are looking for convenience (location, time, flexibility in booking reservations) and troubleshooting resources to answer their questions and receive detailed instructions from service providers with quality offers.

The field of Service Design also addresses these aspects related to the functioning and quality of services and the issues of use of services by customers. Service Design aims to think about a service project by proposing totalizing strategies, which consider all relevant elements and actors, as deepened in the following subsection.

2.2 SERVICE DESIGN

Service Design represents a creative, iterative, and human-centered approach to creating new services that incorporate contributions from service marketing, operations, and information technology, integrated by methods and tools

based in the Design field (Ostrom et al., 2015). This subsection presents the main concepts of this field, emphasizing the Service-Dominant Logic and product-service systems, the main steps considered in Service Design, and notions related to user experience, satisfaction, and quality assessment in services.

2.2.1 Service Design Concepts

Service Design is a new, comprehensive, multidisciplinary, and integrative field that contributes to innovating or improving services to make them more useful, usable, and desirable for customers and more efficient and effective for organizations (Moritz, 2005). For Coxon, Napper, and Richardson (2019), Service Design is relatively recent in the field of Design. Although the term is new, being first coined in 1982, the practice of Service Design, or at least part of it, has existed since the very idea of services (Coxon, Napper, and Richardson, 2019).

Ta, Esper, and Hofer (2018) consider that Service Design refers to the definition of an appropriate combination of key components of service operations, including people, facilities, equipment, technology, and processes, to create and deliver services. The design of each element in the phases before, during, and after service delivery can affect customer expectations and the overall service experience and contribute to establishing competitive advantages. The principal value of Service Design is that, by having a problem-oriented approach, it seeks to go beyond the object or space to capture and integrate a conceptual plan that involves the organization of people, infrastructure, communication, and material components of a service (Coxon, Napper, and Richardson, 2019). Thus, it considers the entire network of human and non-human actors involved. Stickdorn and Schneider (2010) point out that this holistic approach improves quality, human interaction, business competitiveness, and, mainly, the experience between customer and service provider.

For Moritz (2005), professionals in the service sector need to realize they are involved in service design and use Service Design to improve them. Services have unique characteristics: they are not tangible; they cannot be stored or owned. Furthermore, the consumption of a service takes place simultaneously with its

production and consists of complex experiences over time. Therefore, the design of services requires particular considerations (Moritz, 2005).

For Coxon, Napper, and Richardson (2019), the initial iterations of the Service Design approach emerged from marketing and management disciplines. Currently, Service Design uses methods and tools derived from a variety of other disciplines. Thus, it includes not only the various specialties of the Design field itself but other related areas, such as strategy, technology, ethnography, information science, and administration, in addition to the complementary fields of interaction, communication, and industrial design (Coxon, Napper, and Richardson, 2019; Stickdorn and Schneider, 2010).

Pearce (2016) indicates that the purpose of Service Design is to add value, increasing the efficiency and effectiveness of service systems. For Bitner, Ostrom, and Morgan (2008), Service Design requires understanding the customer's outcome and process, how the experience unfolds over time through interactions in many different touchpoints. A well-designed service with a pleasing experience can provide a crucial point of differentiation from its competitors. A service delivered smoothly and with a positive outcome is more likely to result in favorable ratings of service quality and brand image, which influence customer loyalty. On the other hand, recurrent quality of service problems is usually the result of a bad design (Bitner, Ostrom, and Morgan, 2008).

Park and Ramaprasad (2018) consider that the business-oriented Design paradigm has evolved from industry-oriented to customer-centric. Thus, the Design field improved meanings, projecting from the visible functionalities of products to the invisible interaction patterns of service experiences. Moritz (2005) believes that Service Design can address the unique challenges facing the service economy. For this author, Design is not just the execution of details in products, but it is a field that projects complex and interactive experiences, processes, and systems. It involves the knowledge of specialists from different areas and the clients themselves in the design process, using specific strategies, tools, and methods (Moritz, 2005).

For Ostrom et al. (2015), the creative potential of Service Design can play a crucial role in promoting service innovation because it generates and brings service ideas to life, understanding customer experiences, visualizing new service offers, and prototyping them (Coxon, Napper, and Richardson, 2019). Vargo and Lusch (2017) consider it essential to link the Service-Dominant Logic (SDL) and concepts from the

Design field to improve the design of service systems. SDL contributes to understanding Service Design as an exploratory process that aims to create new value relationships between the various actors participating in a service (Vargo and Lusch, 2017).

2.2.2 Service-Dominant Logic

For Vandermerwe and Rada (1988), more and more businesses worldwide are adding value to their main corporate offers through services. The trend present in almost all sectors is driven by customer demand and allows companies to increase their competitive margins. Thus, organizations began to integrate goods, services, support, self-service, and knowledge, providing complete and customer-focused packages. This movement, called “servitization of business, is leading to new relationships between companies and their customers” (Vandermerwe and Rada, 1988, p. 314).

Vargo and Lusch (2004a) consider that marketing inherited a model of economic exchange with a dominant logic based on the exchange of goods and concentrated on tangible resources, incorporated value, and transactions. However, in recent decades, new perspectives have emerged that have a logic focused on intangible resources, co-creation of value, and relationships (Grieger and Ludwig, 2018). Thus, Vargo and Lusch (2004a) believe that these perspectives are converging to form a new dominant logic, in which the provision of services, and not the commercialization of goods, is fundamental for economic exchange.

Therefore, Vargo and Lusch (2004a) introduced the concept of Service-Dominant Logic (SDL). SDL assumes the customer as the center of value creation, in which goods are seen as means of services, with the offer of products integrated with services that offer value in use, that is, the value that the consumer will obtain when the product is used in particular context. Value creation must be seen from a customer-centric perspective, which represents a significant challenge for manufacturing companies, as their business logic still tends to focus on product-based thinking (Grieger and Ludwig, 2018).

Vargo and Lusch (2004b) define services as the application of specialized skills and knowledge through actions, processes, and performances for the benefit of another entity or the entity itself. For these authors, the service can be provided directly or indirectly, that is, through the provision of tangible goods, in which the goods are distribution mechanisms for the provision of services (Vargo and Lusch, 2004b).

For Vargo and Lusch (2017), SDL has two main implications. First, economic activity is understood as exchanging service for service rather than exchanging goods for goods or goods for money. In other words, it is the activities arising from people's knowledge and specialized skills that represent the source of value and the objective of the exchange. Thus, the source of value is in the activities that people want them to do, not in the goods used to deliver these activities. The second implication is that value is co-created rather than created by an actor and subsequently delivered (Vargo and Lusch, 2017). From SDL's perspective, creating value always requires customer involvement. Therefore, understanding and integrating this concept into service networks is crucial (Grieger and Ludwig, 2018).

Vargo and Lusch (2004a) also point out that the service-centric view is customer-centric and market-oriented. This means more than just being consumer oriented. It means collaborating and learning from customers and being adaptable to their individual and changing needs. A service-centric logic implies that value is defined and co-created with the consumer and not incorporated into the output of a product. For Turetken et al. (2019), a business model approach in SDL should adopt a network-centric mindset and allow the composition of Service Design in business networks with multiple stakeholders, including the customer as a value co-creator. Thus, the network as a whole creates the integrated solution that the customer needs (Turetken et al., 2019).

Zuo et al. (2019) consider the sharing economy a type of service economy since exchanges are carried out through services between peers or companies. Therefore, this author highlights the importance of understanding the logic of services to better understand the services in the sharing economy (Zuo et al., 2019). For Zhang, Gu, and Jahromi (2019), the competitive advantages of the sharing economy can be explained by a dominant logic in which service quality contributes to customer value, resulting in customer satisfaction and repurchase intention, which is a manifestation of greater profitability and sales. In this context, customer value is one

of the most critical sources of competitive advantage in addition to the quality of service itself (Zhang, Gu, and Jahromi, 2019).

Considering the context of the sharing economy, Turetken et al. (2019) believe that the shift to SDL business is prominent in the field of smart mobility. The mobility industry is undergoing a significant change from individual vehicles and infrastructure to integrated services that deliver true value-in-use to end-users. A good example is the shift from individual car ownership to service-based ecosystems such as carsharing. Mobility is a promising field, with significant opportunities for exploring the Dominant Logic of Service. Therefore, using a collaborative approach in Service Design that explicitly focuses on delivering value to the customer and considers the nature of multiple stakeholders can offer significant benefits (Grieger and Ludwig, 2018).

The integrated offer of goods and services, present in the Service-Dominant Logic, is also related to the concept of product-service systems (Cherubini, Iasevoli, and Micheli, 2015). Thus, the concepts of servitization, SDL, and PSS are all related (Annarelli, Battistella, and Nonino, 2016; Reim, Parida, and Örtqvist, 2015). Next, the concept of PSS is deepened due to its relationship with Service Design.

2.2.3 Product-Service Systems

Vezzoli et al. (2015) define product-service systems as a model that provides an integrated set of products and services which, together, can meet a specific customer demand, based on innovative interactions between production stakeholders of value, in which the economic and competitive interest of suppliers continually seeks new environmental, social, and ethically beneficial solutions. Also, according to Vezzoli et al. (2015), PSS offers are focused on access and not ownership. Therefore, they reduce or allow users to avoid initial investment and maintenance costs (Vezzoli et al., 2015).

Annarelli, Battistella, and Nonino (2016) point out that authors such as Mont (2002) and Reim, Parida, and Örtqvist (2015) consider PSS as business models by proposing sets of tactics that organizations can implement. These authors consider the relevance of how PSS providers interact, communicate, and use customer and

market information to implement their PSS business model. The long-term relationship (as opposed to a transition-based relationship) has a significant impact on customer loyalty in the context of PSS (Tukker, 2004). This intimate relationship ensures greater insight into the customer's operations and understanding of their needs and preferences. Such insights are valuable for the development of new PSS proposals (Tukker, 2004). Another tactic describes how PSS providers use their network relationships with external partners to ensure that business models are successfully implemented. Service delivery adds several new tasks to the operations of manufacturing or service companies. Companies cannot perform these tasks independently, so they must develop partnership networks and infrastructure (Reim, Parida, and Örtqvist, 2015).

Related to the idea of PSS, Annarelli, Battistella, and Nonino (2016) highlight two emerging fields of research: business models and collaborative consumption. In addition, PSS incorporate the transition from product-based well-being to product-access-based well-being (Boukhris, Fritzsche, and Möslin, 2017). Finally, for Qu, Yu, and Yu (2017), PSS are a good way to defend the idea of sharing. Thus, it is possible to see its relationship with the concepts of sharing economy and collaborative consumption.

Authors such as Couzineau-Zegwaard and Meier (2018) and Mont (2002) consider carsharing systems as one of the prominent examples of use-oriented PSS. For Qu, Yu, and Yu (2017), car sharing is a typical PSS in the mobility sector and is a very innovative mode of transport in reducing the ownership of private vehicles in urban areas, which is essential to minimize the burden of vehicle ownership while maintaining a high level of mobility. The idea of carsharing is to provide access to a vehicle through a short-term rental, in which the user pays only for the period he drives the car. Thus, expenses related to fueling, maintenance, and insurance are paid by the company or individual who owns the vehicle, and the user has access to the car without ownership (Qu, Yu, and Yu, 2017). In this sense, in addition to carsharing, shared mobility systems in general, such as bike and scooter sharing, are also examples of use-oriented PSS (Annarelli, Battistella, and Nonino, 2016).

For Annarelli, Battistella, and Nonino (2016), one of the main challenges in PSS design concerning the sharing economy is understanding all the different stakeholders, their roles, and influences towards each other and the system. Somers, Dewit, and Baelus (2018) state five operable levels related to PSS. One level refers

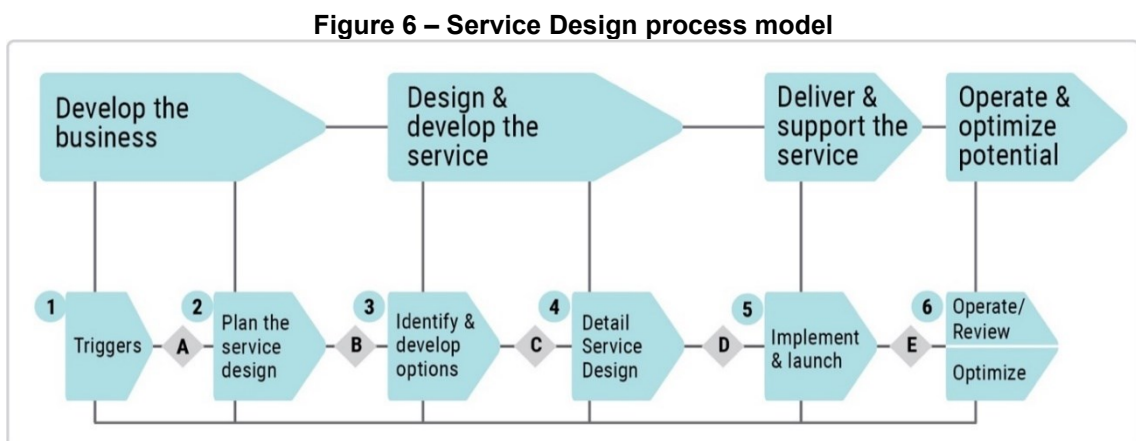
to the characteristics of the product-service, while the other four refer to the levels of stakeholders according to their involvement with the product-service. These four levels are (i) users, (ii) the ecosystem, (iii) the company or organization, and (iv) the society. Designers must consider the five levels to understand and design PSS in a sharing economy context (Somers, Dewit, and Baelus, 2018).

Sharing economy services and product-service systems can be thought and designed using tools and concepts present in Service Design. Although there is no standardized procedure for Service Design, the literature indicates several approaches that seek to explain better the Service Design process in iterative steps (Moritz, 2005; Stickdorn and Schneider, 2010).

2.2.4 Process, Steps, and Tools in Service Design

For Moritz (2005), Service Design is the project of the overall experience of a service and the design of the entire process and strategy to provide this service. It's about understanding customers, organizations, and the market, developing ideas, translating them into viable solutions, and helping to implement them. Service Design is involved in the continuous cycle of services and offers ongoing evolution as services constantly change over time. It is a field that connects organizations and customers in a new way (Moritz, 2005).

Also, according to Moritz (2005), the methodologies used by companies specialized in the practice of Service Design involve different stages. One of them is the Service Design Process, divided into four stages (Figure 6):



Source: adapted from Moritz (2005).

- 1) First stage – Develop the business:
Development of a plan for service (configuring the project, planning resources, designing processes and controls) based on triggers (shortcomings, gaps, opportunities).
- 2) Second stage – Design and develop the service:
At this stage, options are identified and developed (generates options, evaluate, and select the best ones, develop solution concepts, select final concept) leading to detailed Service Design (development of all components, experience specification).
- 3) Third stage – Deliver and support the service:
This stage helps to implement and launch the service (ensure integrity, introduce it to the market, and plan for its launch).
- 4) Fourth stage – Operate and optimize potential:
Deals with the operation of the service itself and constant revisions (delivery, feedback, and maintenance).

Stickdorn and Schneider (2010) comment on other structures and processes, consisting of three to seven steps, proposed in the literature and practice, but all essentially share the same logic. This thesis addresses more specifically the fourth stage, of operation and optimization of the service potential, which is sometimes not present in other methodologies or processes that consider service design only until the stage of its implementation.

It is important to emphasize that although the steps have an order and logic in their development, the Service Design process as a whole is iterative, and the procedures are non-linear (Ostrom et al., 2015; Stickdorn and Schneider, 2010). Thus, previous steps can be resumed as needed for revisiting, refining, or even restarting the project. Iteration also serves to learn from previous mistakes, increasingly improving the project (Stickdorn and Schneider, 2010).

As it has a holistic approach, Service Design seeks to transform the needs and problems identified into interactions planned and created through Design language. They can be visualized, mapped, physically articulated, and felt as experiences. Therefore, a service is a collection of elements that cannot be seen working until they are used (Coxon, Napper, and Richardson, 2019). Thus, Coxon, Napper, and Richardson (2019) indicate that the tools applied in Service Design help

visualize and map the integration of various aspects of motivations, tasks, and interactions that occur during the operation of a service.

One way to express this is by creating a map of the user's journey when using the service. During the provision of a service, the providing company makes several contacts with its customers, ranging from the physical and face-to-face service of a team to more remote contacts such as phone calls, sending messages, e-mails, or other forms of communication through technology resources. These customer interactions are called touchpoints and act as a bridge between the service provider and the recipient (Stickdorn and Schneider, 2010).

For Moritz (2005), the total experience that customers have of a service is built from different contacts with the main components of the service, such as space, products, the team of providers. Each encounter with part of the service is considered a touchpoint, that is, the individual and tangible interactions that make up the total experience of a service. This means that services are complex and exist based on customers' perceptions of different touchpoints (Moritz, 2005). These touchpoints are used to build a journey, the narrative that describes the service based on the users' experience (Stickdorn and Schneider, 2010). Thus, touchpoints are part of the user's journey when consuming a service (Moritz, 2005). For this, maps can be created that help in this visualization through a Customer Journey Map.

Another tool used in Service Design is the stakeholder map, which seeks to identify all relevant actors involved in providing a service (Stickdorn and Schneider, 2010). It is a visual representation of the various groups involved with a specific service. This view allows to map and analyze the interaction between employees, customers, partner organizations, and other actors involved. Moritz (2005) calls this tool the ecology map, which is a process that helps to establish a systemic view of the service and the context in which it will operate. This map presents an overview of all stakeholders, customers, and suppliers of a service system and the relationship between these actors (Moritz, 2005). Thus, this tool is relevant due to its relationship with the principles of Actor Theory -Network (Callon, 1986), signaling and allowing the identification of existing interactions between the various actors that are part of a service's network.

Finally, one of the main tools that allow designers to plan and explain these interactions are diagrams based on time and the actors involved in a service, diagrams known as blueprints (Coxon, Napper, and Richardson, 2019; Moritz, 2005).

A service blueprint is a big plan of the service, involving, in addition to the user journey, all the activities that stakeholders must develop for the correct functioning of the service (Coxon, Napper, and Richardson, 2019; Moritz, 2005). It is also an important tool for improving service quality and achieving service innovation (Zuo et al., 2019). Moreover, it is an effective and adaptable technique for quality improvement, customer experience design, and strategic change focused on customers (Bitner, Ostrom, and Morgan, 2008).

Using all these tools mentioned above, mainly the stakeholder map and service blueprint allows the systemic and visual identification of the network of actors involved in providing a service. It also allows identifying the relevance of interactions between actors for delivering value to the customer and for the quality of the service experience. These interactions are relevant to encourage greater user involvement, leading to their satisfaction and loyalty through a positive user experience.

2.2.5 Service User Experience

For Bitner, Ostrom, and Morgan (2008) and Morton (2018), along with the rapid expansion of services in the economy, there is a growing emphasis in commercial practice on creating meaningful and memorable experiences for customers. The focus is on understanding how a service is perceived by customers, investigating subjective issues (like the behavior of a service's staff) rather than objective facts (like the reliability programmed into a system). From such investigations, service providers can develop strategies to improve the provision of services to expand their market and compete with their competitors (Morton, 2018).

Pine and Gilmore (2013) consider the idea of an experience economy, in which experiences have become the predominant economic offer, being the primary source of new job creation and economic growth. Thus, companies must change their focus to offer immersive and customized experiences (Pine and Gilmore, 2013). Bitner, Ostrom, and Morgan (2008) also argue that the fundamental premise is that companies can no longer compete solely to deliver superior value through their core products but must move into the domain of customer experience management. For this, they seek to create long-term emotional bonds with their clients through the co-

creation of memorable experiences that involve an integrated set of goods and services. Thus, in the loyalty process, significant customer experiences and the resulting emotional ties between customers and suppliers are more important than rational motivations (Bitner, Ostrom, and Morgan, 2008).

Although the terms "customer experience" and "service experience" are often mentioned without explicit definitions, Bitner, Ostrom, and Morgan (2008, p. 4) make customer experience clear as an internal and subjective response that customers have with any direct or indirect contact with a company. Coxon, Napper, and Richardson (2019) state that for the Service Design discipline, a successful outcome is the cultivation of positive experiences. Improved and pleasing customer experiences are more likely to establish repeated behaviors and, by implication, their loyalty. This connection has implications for focusing on where to put efforts into a service provision (Coxon, Napper, and Richardson, 2019).

For Zhang, Jahromi, and Kizildag (2018), the sharing economy context improved users' experience concerning services. According to these authors, in addition to the benefits related to lower investment and financial expenses, customers also enjoy specific experiences for a shared consumption model that is different from the conventional one. For example, for Möhlmann (2015), a carsharing or hosting service user may have more chances to use the service again after having a positive experience. Thus, the sharing economy involves different types of value, from monetary to experiential, which are created together by owners and users.

Experiences are difficult to measure and interpret. They are personal and, therefore, subject to interpretations of a situation and constructed from emotional elements such as mood, cultural expectations, and prior participation (Coxon, Napper, and Richardson, 2019). For Liang, Choi, and Joppe (2018), satisfaction can be measured based on a specific experience. Consumers can compare their previous experience of a service with the current one to determine their satisfaction. For Coxon, Napper, and Richardson (2019), the quality of experience is measured by how a customer chooses to express their perceptions about what was delivered and how well they met the original expectations. Satisfaction embodies a range of senses: pleasure, contentment, novelty. However, satisfaction with the experience of a service does not necessarily indicate loyalty. With loyalty comes specific behaviors, such as disseminating your positive experience with others and using social media (Coxon, Napper, and Richardson, 2019).

2.2.6 Customer Satisfaction and Loyalty

Although the concept of customer satisfaction presents various definitions according to different authors, a broader definition seems to be the most accepted. Liang, Choi, and Joppe (2018) thus point to the idea of satisfaction as the result of evaluating past experiences or the attitude resulting from a mental comparison of the service and quality that the customer expects to receive from a transaction after purchase or use. Yamada (2019), complementing this definition, explains that a customer satisfaction index can be calculated by the difference between the consumer's estimated expectations before using a service and the value perceived by the consumer after using it.

In assessing customer satisfaction with services, it is possible to see that intangible and tangible aspects are pointed out as influencers. Möhlmann (2015) studied the determinants of satisfaction in the collaborative online economy, both in the B2C and C2C models, and found that utility, reliability, cost savings, and familiarity with the service are essential for satisfaction. Mont and Plepys (2003) indicate that when assessing satisfaction with a product, customers initially consider the tangible features of the product. In the context of a service, resources, although observable, are considerably less tangible and therefore more challenging to assess. In the case of product-service systems, customers are exposed to both dimensions: product and service. Mont and Plepys (2003) then consider that PSS comprise four main components: (i) products, (ii) services, (iii) infrastructure, and (iv) networks. In this sense, in addition to being exposed to the dimensions of products and services, customers also interact with the infrastructure and networks that support PSS delivery. Therefore, assessing all four components becomes relevant to assess satisfaction (Mont and Plepys, 2003).

Although services are essentially intangible, they are provided with the help of several material aspects. Among them, as already mentioned, are the touchpoints and the supports that contribute to the delivery of a service, such as the physical environment and related products. For Maioli, Carvalho, and Medeiros (2019), the tangible aspects of services can also contribute positively to user satisfaction.

When surveying user satisfaction in public transport services, Coxon, Napper, and Richardson (2019) point out that studies of service failures revealed that

the appearance of the physical environment is a harmful factor. From interior design to employee uniforms, all these items are tangible to support the transportation company. Thus, elements such as layout, seating comfort, interaction with electronic payment terminals, and vehicle cleaning affect satisfaction and user return to that service (Coxon, Napper, and Richardson, 2019; Akhmedova, Mas-Machuca, and Marimon, 2020). Likewise, Maioli, Carvalho, and Medeiros (2019), in a study on aspects related to satisfaction in a bicycle sharing service, observed the importance of other functional elements. Among them, they highlight comfort, the system's availability, the applications that are compatible with the operating system of smartphones, and the availability of the bicycle at the reserved time. In addition, efficiency also contributes to user satisfaction, such as a quick response to system, station, and application commands (Maioli, Carvalho, and Medeiros, 2019).

Also, considering these issues related to the correct functioning of the system, Zuo et al. (2019) emphasize that, in the sharing economy, the platform is not a direct service provider, but a means that uses information technology to establish a connection between service providers and service recipients. Thus, the platform, providers, and recipients constitute a system and a network of services. Therefore, Zuo et al. (2019) consider optimizing this service network to improve customer satisfaction as an essential topic in service research.

Satisfaction with a product or service is decisive to determine the repurchase intention (Liang, Choi, and Joppe, 2018). For Kumar, Lahiri, and Dogan (2018), service satisfaction can be observed through the user's interaction with the various aspects of the service, such as the product, delivery, and environmental components, in addition to the perceived quality of the service and the overall experience. This general perception also results in a substantial impact on customer loyalty.

Cheng, Fu, and Vreede (2018) show the relationships between service quality, satisfaction, and loyalty, stating that satisfaction directly influences loyalty. Thus, satisfaction is a partial mediator between service quality and loyalty (Cheng, Fu, and Vreede, 2018). Therefore, satisfaction with a service, that is, the difference between expectation and value perceived by the consumer in the experience of a service, can impact user loyalty and return (Akhmedova, Marimon, and Mas-Machuca, 2020).

2.2.7 Customer Perceived Value

Holbrook (2006) and Yin, Qian, and Shen (2019) point out that among the various aspects of value, consumer value is a central topic in current marketing discourse because generating superior customer value is considered a goal to maintain the competitive advantage of companies. For Gallarza, Gil-Saura, and Holbrook (2011), the concept of consumer value is inextricably linked to the primary constructs related to marketing, such as perceived price, service quality, or customer satisfaction. For Zhang, Gu, and Jahromi (2019), there are two essential similarities in all definitions of value: (i) value is created using products and services, and (ii) is based on customer perceptions, which involves a comparison between the benefits customers receive and the resources they spend in exchange for using the product or service (Zhang, Gu, and Jahromi, 2019).

Zhang, Gu, and Jahromi (2019) also state that when considering a consumer-centric perspective, customer perceived value is a personalized and holistic experience: it is a subjective assessment of the provision of positive and negative services, it is the final factor that explains customer preferences for service attributes and performance of these attributes, resulting in purchasing behaviors and consequences. This definition can be formulated as a proposition that captures the essence of service offers. Lee, Lee, and Kim (2019) consider customer value an essential predictor of customer behavior and decision-making. Hence, providing consumers with superior value is expressed in aspects such as quality of service and unique features. Consequently, companies are advised to understand what constitutes a customer value proposition and then prioritize the buying motives in various service development and delivery processes. In this way, value is created when customers' perceptions of the benefits of consuming a product or service outweigh the costs incurred by its use. Value is also perceived in other ways, such as the emotional bond created between customers and suppliers, resulting in added value for customers (Zhang, Gu, and Jahromi, 2019).

The concept of customer's perceived value helps explain the different facets of consumer behavior that occur before, during, and after the experience of purchasing a product or using a service (Gallarza, Gil-Saura, and Holbrook, 2011). Among these aspects, the perceived quality stands out: the consumer's judgment on

the excellence or superiority of a product or service and its intention and repetition of the use of the service (Zeithaml, 1988). For Holbrook (2006), the concept of customer value allows encompassing the idea of the Service-Dominant Logic, in which the customer's priority became a value. Therefore, the concept of the customer's perception of value is key to obtaining a differential or competitive advantage (Gallarza, Gil-Saura, and Holbrook, 2011).

Lee, Lee, and Kim (2019) propose four dimensions of customer value, namely: (i) functional value, (ii) epistemic value, (iii) conditional value, and (iv) emotional value. Functional value is quality and utility recognized by using a product or service, present in interactivity features such as ubiquitous connectivity, service convenience, and two-way communication. Epistemic value is related to the utility gained from the ability to provide novelty and satisfy a desire for knowledge. It includes obtaining information and satisfying an interest in understanding. Users want to receive the appropriate information, and this desire affects consumers' knowledge. Conditional value is related to the efficiency of the product or service recognized when faced with a specific situation or set of circumstances. It is related to the conditional effects of a specific situation on the perception of value. Emotional value is a value recognized when specific emotions are felt or triggered. This means that customers can recognize specific emotions when using the service (Lee, Lee, and Kim, 2019).

In addition to these four value dimensions, Lee, Lee, and Kim (2019) highlight the monetary payment for the service as a crucial decision factor for service users. For these authors, consumers must pay for the service each time they use it. Therefore, the intention to reuse services reflects the intention to repurchase services. Consumers make decisions and behave to maximize value. Due to this perspective, clients consume exchanges with service providers that provide maximum value (Lee, Lee, and Kim, 2019).

Perceived value is seen as a positive influence on loyalty, as it is a relevant perspective for a comprehensive understanding of loyalty behavior (Gallarza, Gil-Saura, and Holbrook, 2011). Thus, the value perceived by the consumer can be used as a theoretical basis to explain customers decisions when using a service, both in the initial use of a potential customer and in their repetitive return, helping to explain repetitive purchase actions, specifically in the development of a relationship with the service provider, resulting in the return and loyalty of customers (Lee, Lee, and Kim,

2019). Furthermore, the effects of the customer's perception of value are also related to the feedback behavior by satisfaction and loyalty to the perceived value (Gallarza, Gil-Saura, and Holbrook, 2011). Therefore, the value perceived by the customer, which influences their satisfaction and loyalty, is related to their involvement and engagement with the company that provides the service and interferes with the eWoM disclosed by consumers.

2.2.8 User Engagement and eWoM

Consumer engagement is a multidimensional concept comprising cognitive, emotional, and behavioral dimensions that play a central role in the relational exchange. Due to its interactive nature, user involvement has particular relevance in the service context, characterized by high interactivity between customer and brand (Kumar, Lahiri, and Dogan, 2018).

For Park and Ramaprasad (2018), understanding users and their knowledge is a critical factor in creating improvements in the design process. Sopjani et al. (2019) suggest that users should be involved in design processes to improve their quality, meet user needs, and make products and services easier to use. Turetken et al. (2019) establish a relationship of the involvement and perspective of the customer's role with the Service-Dominant Logic, which considers the customer an indispensable part in the value creation process and an essential part in the co-creation of value.

For Hu (2019), developing a solid customer relationship can improve customer loyalty, which, in turn, leads to greater profit for the company. A strong relationship is an intangible asset and a competitive advantage. Relationship breadth focuses on how relationships evolve (for example, by loyalty programs). The depth of the relationship focuses on the various factors that strengthen or weaken a connection at a specific stage, such as trust, satisfaction, brand value, communication, and conflict (Hu, 2019).

Regarding services in the sharing economy, Hu (2019) points out that building long-term relationships is essential to obtain relational benefits and obtain sustainable competitive advantages for companies. In the sharing economy, the bad

behavior of a guest, driver, host, or passenger carries much more weight than the bad behavior in a market transaction. Moreover, there are additional peer trust needs on sharing platforms. Thus, building a strong relationship between customers and businesses is urgently needed (Hu, 2019).

Social networks have largely made it possible to strengthen the relationship between companies and their customers. Roy et al. (2018) exemplify that today customers help service companies and their employees by providing suggestions for service improvements. In addition, they help other customers through online engagement platforms to improve their experiences. For Roy et al. (2018), companies make significant investments in providing engagement platforms for their customers. Consequently, customers help companies and other customers from these platforms, contributing to improving the experience and service. Vasques (2015) mentions the role of social media (such as Facebook and Twitter) as tools to obtain relevant information from users, which allows monitoring of usage and customer acceptance.

Ambrosino et al. (2016a) comment that transport providers and mobility service operators are increasingly operating their accounts on social media, such as Twitter and Facebook, being a new communication channel with their users. These media are used to distribute live news and information about road and service conditions, events, accidents, route and travel recommendations, and the like, with resources to reach large groups of users effectively and on time. In addition to the information distributed by companies, information provided by users can also be shared with the community (Ambrosino et al., 2016a).

When using a new service or product, potential consumers often resort to search and rating mechanisms to verify the reputation and quality of the company in question. In the past, the expression of word-of-mouth disclosure was used in marketing, referring to the indication received by people you know about a service or product, which often has a much greater weight in the decision (Yin, Qian, and Shen, 2019). Currently, with the advancement of Web 2.0, this expression came to be called electronic word of mouth (eWoM). In this context, users research the evaluations of other customers who have already used the service. Even if they do not know them, they use these recommendations in their decision-making (Yin, Qian, and Shen, 2019).

Yamada (2019) considers that reputation information websites attract a lot of attention, allowing users to share their experiences and ratings of service with other users. For Yamada (2019), a consumer estimates the credibility of a service evaluation based on the credibility of the information and the number of evaluations found. Thus, instead of just evaluating their expectations based on past usage experiences, a customer can estimate their expectations through the review websites without having used the service, based on the experiences and reports of others (Yamada, 2019).

For Yin, Qian, and Shen (2019), eWoM in social media reinforces value formation, and positive dissemination among customers can strengthen the company's relationship with its consumers. On the other hand, negative eWoM can ruin companies' reputations and discourage users. Zuo et al. (2019) point out that eWoM has a significant impact on consumer purchase decisions. Islam et al. (2019) state that the evaluations that customers make about a particular brand or service tend to influence the purchase intention of other customers, minimizing their perceived risks. Furthermore, negative comments have a more significant impact on consumers, and people are more likely to complain than to write positive comments about a company in the online environment (Dancer, Filieri, and Grundy, 2014). Therefore, companies should use eWoM results data to find problems in providing their services (Zuo et al., 2019).

Dewit and Baelus (2018) state that in sharing economy services, reputation is extremely valuable. This reputation depends on the quality of the feedback systems present, and the number of users engaged in the platform. Wilhelms, Henkel, and Falk (2017) cite the failure of a peer-to-peer (P2P) car rental company. According to these authors, the company's business closure occurred partially due to negative customer feedback, resulting in poor online ratings. Other factors considered were rapid expansion and subsequent inability to provide good customer service due to increased demand (Wilhelms, Henkel, and Falk, 2017).

Wynstra, Spring, and Schoenherr (2014) reinforce that service quality depends heavily on the interaction between supplier and customer. Thus, the perceived quality of the service can improve the relationship between company and customer, leading to customers' intention to share information with the service company and spread their positive experience among acquaintances. Zhang, Jahromi, and Kizildag (2018) state that service value is a dynamic concept that

customers can only perceive after consumption. Therefore, the post-consumption stage is associated with subjective or emotional feedback from customers. For Wang, Lian, and Zhao (2019), unlike the traditional economy, in sharing economy services, service quality is largely monitored by the users through their evaluations and feedback.

2.2.9 Customer Feedback on Social Media

Callon (2017) states that for a consumer to decide to purchase a product or use a service, they need to know and evaluate its characteristics. Sometimes they can do this directly, but often, and particularly in the case of services, the assessment is only possible after use, in the post-consumption phase. Thus, to reduce uncertainties surrounding the transaction, different devices and procedures were created to characterize (and guarantee) the service quality, such as controlled names, technical standards, labels, or certificates (Callon, 2017).

In addition to certificates and recommendations that seek to guarantee a product or service quality, disclosure among customers has also gained a lot of space, as it even influences the company's reputation. Thus, before consuming a service, consumers consider the recommendations of friends or relatives who belong to their social networks and whom they trust (Callon, 2017). With the emergence of social media and Web 2.0, however, these recommendations are not limited to acquaintances but can be expanded to people outside the community who share a positive or negative experience with services in common (Casprini, Minin, and Paraboschi, 2019).

For Heinonen and Strandvik (2018), marketing scholars tend to see social media as a key element in creating and maintaining customer engagement, fostering deeper relationships, improving word of mouth communication, and improving (or disqualifying) the brand. Thanks to social media, consumers are involved in various activities, from consuming content to participating in discussions, sharing knowledge with other consumers, and contributing to other consumers' activities (Heinonen and Strandvik, 2018). In addition to marketing researchers, for Casprini, Minin, and Paraboschi (2019), innovation and technology management scholars shed light on

the challenges that social media are bringing to strategy, innovation activities, and business models themselves. Social media allowed new ways to create and capture value, allowing the emergence of a community of active users (Casprini, Minin, and Paraboschi, 2019).

Casprini, Minin, and Paraboschi (2019) also point to the emergence of a new social customer relationship management strategy. This strategy recognizes that rather than managing customers, the role of business is to facilitate the collaborative experiences and dialogue that customers value. As such, organizations need to carefully consider how they can create a unique social media experience for their brand, deliver customer value, and avail the power of the social community. For many companies, social media can become one of the main communication channels to connect with customers. Therefore, as organizations design their social media strategies, they need to think about their customers and consider their social media interactions in the context of other points of contact with the company (Wilhelms, Merfeld, and Henkel, 2017).

Considering the context of the sharing economy, in particular the emerging shared mobility services, authors such as Wilhelms, Merfeld and Henkel (2017), Casprini, Minin and Paraboschi (2019), and Yin, Qian, and Shen (2019) highlight the relevance of using information shared by customers about these services and social media platforms. This information can contribute to verifying issues of quality, satisfaction, or points of service failure.

2.2.10 Service Quality

For Silalahi, Handayani, and Munajat (2017), service quality is an important aspect that can determine customer behavior, satisfaction, and intention in using it. In addition, service quality can provide long-term success and be an important competitive advantage (Zuo et al., 2019). Therefore, it is vital to assess and measure quality, especially in services provided in the online environment (Silalahi, Handayani, and Munajat, 2017).

Zuo et al. (2019) relate service quality to Service Design itself, stating that improving service quality depends significantly on excellent design. Thus, they also

list the blueprint as a vital tool to enhance service quality. Furthermore, as it uses qualitative analysis of the service process with an intuitive flow chart, the blueprint can specify essential elements in the service system, including the service process, touchpoints, provider actions, customer actions, physical evidence, and service support processes (Zuo et al., 2019).

The perception of service quality depends on a customer's experience when consuming the service (Parasuraman, Zeithaml, and Berry, 1985; 1988). In the context of the sharing economy, a user of services such as carsharing may be more likely to use the same service again when having a positive experience (Möhlmann, 2015). In addition, it is an established opinion in the consumer survey that the perceived quality of the service is identified as an important antecedent of satisfaction and the intention to use the service again and guarantee the customer's return (Möhlmann, 2015). Li et al. (2019) also state that the commitment strategies adopted by the service platforms are positively related to the internal service quality. Specifically, the quality of an internal service guaranteed by service providers is significantly influenced by the relationship between the service platform and service providers, that is, between all actors involved in the delivery. Thus, quality and a positive experience with a service can impact customer loyalty, including in the sharing economy and collaborative consumption segment (Li et al., 2019; Möhlmann, 2015).

Service quality can be understood as the judgment of a customer evaluation process, considering their expectations concerning a service and the comparison they make with the service perception they have received (Grönroos, 1984; Silalahi, Handayani, and Munajat, 2017). Parasuraman, Zeithaml, and Malhotra (2005) reinforce this concept, stating that service quality derives from comparing what customers think a company should offer (their expectations) with the actual performance of the service.

Parasuraman, Zeithaml, and Berry (1988) further distinguish the difference between the concepts of quality and satisfaction. According to these authors, satisfaction is measured considering a specific transaction or experience of use. On the other hand, service quality is the general perception or judgment that the customer has about the service and the company that provides it, and less oriented towards a particular situation (Parasuraman, Zeithaml, and Berry, 1988). However, despite having different definitions, the two constructs are related since incidents of

satisfaction over time result in perceptions of service quality (Parasuraman, Zeithaml, and Berry, 1988).

Distinctively from product quality, which can be objectively measured by indicators such as durability and defects, service quality is an abstract and indescribable construction due to three characteristics of services: intangibility, heterogeneity, and inseparability of production and consumption (Parasuraman, Zeithaml, and Berry, 1985). Besides, Moritz (2005) states that service quality is difficult to measure since measures tend to be qualitative, and there are few quantitative measures. As a result, there is more significant variability in services, and it is more difficult to control their quality. Even so, there are instruments to assist in these quantitative and qualitative measurements, which are important indicators of service quality and influence satisfaction and loyalty (Cheng, Fu, and Vreede, 2018).

The service quality model proposed by Grönroos (1984) considers that service quality, as perceived by the customer, can be divided into technical quality dimensions and functional quality dimensions. Technical quality corresponds to the instrumental performance of the service consumers receive from their interactions with a service company. Often the technical quality can be measured objectively by the consumer, in the same way as the technical dimension of a product (Grönroos, 1984). However, the consumer is not only interested in what he receives as a result of the service production process but in the process itself. Thus, the functional quality corresponds to the expressive performance of a service, or how the technical result was obtained functionally. This dimension is perceived in a much more subjective way by the client (Grönroos, 1984; Mont and Plepys, 2003).

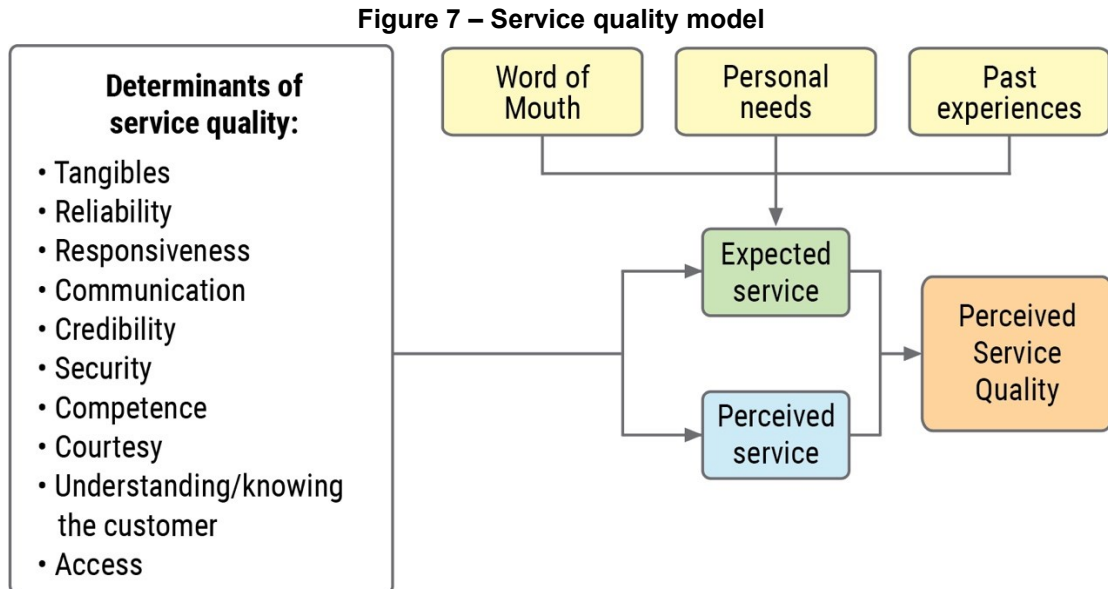
Cheng, Fu, and Vreede (2018) identify five service quality factors, three related to offline service quality (information congruity, competence, and empathy) and two related to online service quality (structural assurance and platform responsiveness). Information congruity refers to the correspondence between the platform descriptions and the information presented. Competence is the ability of the providing company to guarantee the promised service (Cheng, Fu, and Vreede, 2018). Empathy refers to the personality and benevolence of stakeholders or employees towards customers. Structural assurance refers to institutional guarantees that protect the user against loss of privacy, money, and security in terms of online service quality factors. And, finally, the platform's responsiveness refers to the

availability of a platform to help users and provide services in real-time (Cheng, Fu, and Vreede, 2018).

Morton (2018) states that a series of instruments was developed to monitor service quality in a set of dimensions present in most service configurations. Islam et al. (2019) point out that two main strands suggest instruments to assess service quality. The North American school, based on the SERVQUAL scale (Parasuraman, Zeithaml, and Berry, 1988) proposes five dimensions, including tangible aspects (the physical environment of the service, including the appearance of the service team); reliability (ability to perform services as promised); responsiveness (willingness to help customers); assurance (ability to inspire trust among customers) and empathy (individualized attention towards the customers). The Nordic school, on the other hand, based on the Grönroos model (1984), suggests the dimensions of technical quality and functional quality only. Although there are different instruments and scales developed, SERVQUAL (Parasuraman, Zeithaml, and Berry, 1985; 1988) represents one of the most frequently applied instruments (Silalahi, Handayani, and Munajat, 2017; Mont and Plepys, 2003), which withstood the test of time and is still considered a valid descriptor of service quality (Catulli, 2012).

2.2.10.1 Main dimensions of service quality

In an exploratory study, Parasuraman, Zeithaml, and Berry (1985) point out that the criteria used by consumers in assessing service quality fit into ten potentially overlapping dimensions (Figure 7): (1) tangibles; (2) reliability; (3) responsiveness; (4) communication; (5) credibility; (6) security; (7) competence; (8) courtesy; (9) understanding/knowing the customer and (10) access.



Source: adapted from Parasuraman, Zeithaml, and Berry (1985).

Figure 7 illustrates that these ten determinants of service quality are evaluated by the customer based on expectation and perceived service and considering the Word-of-Mouth disclosure received personal needs and previous experiences. Thus, the set of these elements results in the perceived quality of the service. Therefore, the description of these ten dimensions served as a basic structure of the service quality domain, deriving for the items of the SERVQUAL measurement scale (Maioli, Carvalho, and Medeiros, 2019; Parasuraman, Zeithaml, and Berry, 1985; 1988) composed of five dimensions:

- (1) Reliability: the ability to perform and deliver the service as promised.
- (2) Responsiveness: Willingness to help customers and provide prompt service.
- (3) Assurance: knowledge and courtesy of employees and their ability to inspire confidence in customers.
- (4) Empathy: concern with the individual attention that a company provides to its customers.
- (5) Tangibles: equipment, physical space, and employee appearance.

According to Parasuraman, Zeithaml, and Berry (1988), SERVQUAL is a concise multi-item scale with good reliability and validity that providers can use to better understand consumers' expectations and perceptions of service and, as a result, improve service. In addition, the instrument was designed to apply to a broad

spectrum of services and is also more valuable for tracking possible improvements (Parasuraman, Zeithaml, and Berry, 1988).

Catulli (2012) considers that SERVQUAL dimensions can be used to measure the quality of product-service systems. By replacing ownership of a product with a package of products and services that allow access to them, many consumers fear if this type of provision will meet their expectations (Catulli, 2012). Thus, SERVQUAL can contribute to measuring consumers' uncertainties regarding the adequacy of the PSS to their needs, measuring their satisfaction and perceived quality.

For Cheng, Fu, and Vreede (2018), the classic SERVQUAL instrument considers five indicators based on traditional commerce without Internet support. Therefore, Parasuraman, Zeithaml, and Malhotra (2005) developed a scale called E-SQUAL to measure the quality of electronic service (e-service) delivered by digital means. In addition to the dimensions already present in SERVQUAL, the ES-QUAL model also covers technical aspects such as access, efficiency, service, system availability, ease of navigation, privacy, and security issues (Cheng, Fu, and Vreede, 2018).

An apparent limitation of the SERVQUAL approach is the need to perform two measurements of each item, which can make the application of the instrument somewhat complicated (Morton, 2018). To solve this problem, Cronin and Taylor (1994) developed the SERVPERF scale, based on SERVQUAL and its proposed dimensions, but using only the perception of service performance to measure customer satisfaction (Maioli, Carvalho, and Medeiros, 2019), allowing the inclusion of issues such as satisfaction, retention, and recommendation to provide a complete assessment of the customer experience (Morton, 2018).

Regardless of the scale, it is clear that practically the same elements are considered as parameters for measuring quality. These parameters influence the customer's experience and satisfaction of service, contributing to their general perception of the quality of the service (Maioli, Carvalho, and Medeiros, 2019). In addition to these tools and the more conventional satisfaction surveys, questionnaires, and interviews, service companies currently have other means to verify the level of satisfaction of their customers. For example, the different reputation and feedback assessment systems, often made possible by social media, are instruments that contribute elements to assess the quality, satisfaction, and

perception of customers about a service, since they are free to express their opinion for other consumers to have access (Wang, Lian, and Zhao, 2019).

Arcidiacono and Pais (2018) carried out a study to analyze carsharing services from user's perspectives and customer experience, based on SERVQUAL (Parasuraman, Zeithaml, and Berry, 1985). Arcidiacono and Pais (2018) conclude that carsharing services generate a high level of satisfaction among their users, who particularly appreciate the innovative mode of delivery, fun, flexibility, and convenience. Moreover, price is not a critical factor, probably due to the users' medium-high social profile. However, city users are pushing for a more customizable pricing model to enhance and reward those who use it more often. On the other hand, families that move with flexibility are more interested in being able to use different types of vehicles (even larger and more comfortable to travel with more people) and with special equipment that meets their needs, such as transporting babies or animals (Arcidiacono and Pais, 2018).

As already mentioned, the perception of service quality by the customer depends on a series of factors, including the organization of the network of actors that make up the service system. Laczko et al. (2019) point out that it is the role of the central actor to be able to create different feedback loops that encourage stakeholders to participate in the evaluation process. Thus, the relationship between the actors that constitute the service network is significant.

2.2.11 Service Stakeholder Networks

According to Baek et al. (2018), as services are essentially an interaction between people who aim at values, services intrinsically imply collaboration, and their encounters are collaborative. These interactions can generate interpersonal bonds, in which the strength of a social bond is defined as the average strength of interpersonal bonds in a collaborative encounter (Baek et al., 2018). This idea derives from the concept of strength of ties by Granovetter (1983), who classified interpersonal ties as strong, weak, or absent. Strong ties can take decades to form, while weak ties form more quickly. The strength of these ties is useful for measuring the intimacy of social networks and the openness of an organization: weak ties play a

critical role in connecting an organization to the outside world, enabling innovations such as collaborative and sharing services (Baek et al., 2018).

Baek et al. (2018) also point out that human encounters are contingent and spontaneous in nature, making them impossible to predict or control. Therefore, one of the roles of Service Design is to create the right conditions for actors' relationships to develop in the desired direction. Thus, it is necessary to understand what current relationships are like and how they need to develop. For Stickdorn and Schneider (2010), a successful Service Design project requires integrating stakeholders as early as possible in the project development process. In addition, communication between the parties must be constant.

According to Li et al. (2019), service providers maintain cooperative relationships with the service platform and customers to offer better services and ensure service quality. Thus, to provide a high-quality service, it is essential that the three actors – platform provider, service provider, and consumer – maintain a positive and balanced relationship. This idea is related to triads in the sharing economy (Kumar, Lahiri, and Dogan, 2018).

Among the characteristics that can help actors in these service triads maintain a mutually positive relationship, Li et al. (2019) highlight the attractiveness. Attractiveness implies that the three parties can enjoy and benefit from obtaining information and exchanging resources, interacting with each other, which can guarantee a high level of service quality. A balanced service platform maintains a positive relationship with service providers and customers, which helps providers better interact with customers and the service platform. Thus, positive relationships help service providers ensure positive customer feedback while delivering high-quality services to customers. Li et al. (2019) argue that service platforms should actively control service quality levels before and after service delivery by maintaining mutually cooperative relationships. Therefore, maintaining positive relationships is essential for improving service quality levels (Li et al., 2019).

As already pointed out, the relationship between actors or stakeholders in services can be better studied using Service Design tools such as the stakeholder map and the service blueprint. However, in addition to understanding how relationships work in practice, it is equally important to understand the concepts that explain how such relationships are built and change over time. One of the theoretical

constructs in this sense and which supports the thesis is the Actor-Network Theory (ANT) and the idea of solution-demand networks, further discussed next.

2.3 SOLUTION-DEMAND NETWORKS

Based on the principles of dynamics in actor networks proposed by the Actor-Network Theory (ANT), for Callon (1999), actors in a network act and make their decisions according to their interests, in processes that involve interaction, negotiation, and discussion, as it conflicts with the interests and actions of other actors. Furthermore, Callon (1999) highlights that these actions cannot be predicted or predetermined since the dynamics in a network are modified and built as the relationships take place.

This understanding is related to the functional economy idea. In this economic model, consumers, as actors, do not know what use-value they need, and producers and suppliers cannot impose the answer to this need (Gidel, Huet, and Bisiaux, 2016). For Cova (1995), from a mechanistic modernist perspective, it was no longer possible to fit consumers into pre-defined boxes, making it possible to predict their behavior, which was seen as a severe disorder. However, from a post-modern perspective, it is possible to abandon the study of consumer presetting for consumption situations, their environment, and trends, which influence consumer behavior (Cova, 1995).

Thus, in the context of a functional and sharing economy, solutions are co-created between producers, suppliers, and consumers (Gidel, Huet, and Bisiaux, 2016). Therefore, the proposed concept is that adapted solutions will emerge from the interactions and co-creation between the different actors in the network, in a dynamic cooperation process, constituting solution-demand networks (Gortz, 2017).

In this context, solution-demand networks are understood as heterogeneous networks, formed by different actors (producers, designers, and engineers, suppliers, merchants, consumers, products, public and private services), which, through translation processes, negotiation, cooperation, and co-creation are articulated around a common objective, aimed either at proposing a possible solution to an

existing demand or at specifying a potential demand for an available solution (Gortz, 2017).

Considering the context of the Service-Dominant Logic (Vargo and Lusch, 2004a) or access-based consumption (Bardhi and Eckhardt, 2012), Cova (1995) points out that the sustainable society of the future will be a society of services, that is, a society whose economy will be centered on the supply and demand of services and in which, in terms of behavior, there will be a shift from ownership and consumption of products to access and use of services. In this scenario, services largely contribute to social quality, as each service creates a social bond between customers and suppliers (or even between customers and other customers). But above all, the very idea of service is rethought in the non-simplistic sense of a system that serves, which implies high costs of specialized personnel and relegates the user to the role of comparison, in the understanding of a structure destined to the mobilization of social resources and the promotion of the users' capacities, which collaborate in obtaining the result as the main protagonists (Cova, 1995). In this way, in a service solution-demand network, all actors involved play a leading role that is not limited to consuming or providing the service.

For Heinonen and Strandvik (2018), technological transformation paved the way for customers who are increasingly active in the markets and cooperate with companies on their terms and direct their interests individually and collectively. Consumers now seek to exert their influence and expertise in all parts of business operations, including product pricing and pricing strategies (Zhang, Jahromi, and Kizildag, 2018). Examples of these activities are customer-oriented innovation, user-generated content, ratings, and feedback on social media and reputable websites (Heinonen and Strandvik, 2018).

In this way, customers can currently express their demands and find new possibilities for using existing services and products. Companies, in turn, can use customer opinions as constant feedback to monitor and improve their services (Casprini, Minin, and Paraboschi, 2019). In addition, developers can adapt existing solutions to identify emerging demands and develop new solutions that meet them.

Therefore, user experience strategies, which seek to design solutions that precisely meet customers' demands and are built together with them, are so relevant, especially in the context of Service Design (Ampudia-Renuncio, Guirao, and Molina-Sanchez, 2018). In addition, the methods and tools that allow potential customers to

be included in the initial stages of service and product projects (Gargiulo et al., 2015) can contribute to the development of solutions that are more adapted to the demands or to the adaptation of existing solutions in identifying new demands.

This involvement between actors of a service network can help to understand better which steps need to be refined and adjusted. The following subsections address some of the main foundations of the Actor-Network Theory and elements related to network dynamics and value co-creation networks, which support the concept of solution-demand networks.

2.3.1 Actor-Network Theory Fundamentals

Actor-Network Theory (ANT) had its origins in science sociological studies in the 1980s, with the works of authors such as Callon (1986; 1999), Latour (1996, 2005), and Law (1992). ANT is a perspective and a methodology that focuses on constructing socio-technical networks, composed of human and non-human elements, as necessary tools to gain support and acceptance of innovative ideas (Baraldi et al., 2019). ANT emphasizes the importance of materiality, considering material elements in networks as crucial as social ones, through the concept of actants, which also encompasses non-human aspects such as actors (Callon, 1986). One of the theory's most distinctive features is recognizing that non-human actors also have an active role in the course of action (Latour, 2005).

For Law (1992), the Actor-Network Theory is a theoretical and empirical perspective that treats social relations, including power and organization, like network effects. Furthermore, the theory is distinct because it insists that networks are materially heterogeneous and argues that society and organizations would not exist if they were simply social. In this way, agents, texts, devices, and architectures are part and essential for social networks. Law (1992) considers, therefore, as the central point of the Actor-Network approach: the concern with the way actors and organizations mobilize, juxtapose and keep together the parts of which they are composed, as they are sometimes able to prevent these fragments from following their own inclinations, and how they manage, as a result, to transform a network from

a heterogeneous set of parts, each with its own inclinations, into something that passes through the central actor (Law, 1992).

Actor-Network Theory encompasses a wide variety of disciplines and empirical domains. Since its initial focus on creating scientific knowledge in Science and Technology Studies, ANT has also been applied to the concepts of market creation and commercialization (Callon, 1999; 2017). Baraldi et al. (2019) relate the importance of ANT with the increasing number of startups. The recognition of connections between material, immaterial, social, and technical elements in the context of an actor's network incorporated in a startup allows researchers to identify a broader range of opportunities and obstacles that this context can bring to new ventures. These opportunities and barriers stem from the fact that a startup needs to fit in and become part of a network structure and keep up with the network processes that change that structure over time. Thus, ANT represents a less applied view but potentially more innovative, as it helps explain the dynamic relationships between different actors in a network, whether human or non-human (Baraldi et al., 2019).

ANT as a whole is complex and encompasses a set of distinct elements. Therefore, to avoid a superficial review of all its aspects and considering the theme and objectives of this research, some of the fundamentals considered most relevant for this study were selected. The following will be addressed among these aspects: heterogeneous networks of human and non-human actants; translation process and interactions of network dynamics.

2.3.1.1 Heterogeneous networks of human and non-human actants

One of the main foundations of the Actor-Network Theory is to understand that there is no distinction between humans and non-humans in constructing sociotechnical networks (Callon, 1986; Latour, 1996; 2005; Law, 1992). Thus, networks are considered heterogeneous, suggesting that society, organizations, agents, and machines are all effects generated in standardized networks of diverse materials and not simply humans (Law, 1992). Furthermore, the principle of generalized symmetry (Callon, 1986) allows us to look at the dynamics symmetrically established between actors without human or technical determinism.

For Batista and Meyer (2018), network dynamics analysis of Actor-Network Theory is based on the equivalence between human and non-human actors, considering relations of equality and reciprocal implication, since it is difficult to distinguish the differences between actions of human and non-human actors empirically. To reinforce the generalized symmetry and achieve an impartial equivalence between humans and non-humans, the ANT suggests the use of the term actant, that is, one who acts or has agency, something that acts or one that makes the other do, anything that provides or is capable of being a source of action (Latour, 1996). For Latour (2005, p. 54), the term actor limits humans, so the term actant was adopted from semiotics to include non-human elements in the definition. This term thus represents the ANT effort to include non-humans in social understanding and agency skills (Batista and Meyer, 2018; Callon, 2017).

Actor-Network Theory also considers another meaning for social understanding. For Latour (2005), based on the Latin *socius*, the word social means following, denoting a company and association. Therefore, it is not only related to the human, but also to the associations and interactions created in the socio-technical dynamics, being a kind of momentary association, characterized by the way they relate. Thus, one of the ways to identify the actants (human and non-human) in a network is to follow their tracks, as each action carried out brings consequences for the other actants present in the network (Callon, 1986).

Relating ANT ideas to entrepreneurship-oriented businesses, Baraldi et al. (2019) consider that the theory not only emphasizes that an entrepreneurial idea requires a complex network of allies (Callon, 1986), but also that the critical elements in this network are the non-humans and that all these actors must be aligned around the same interest and objective. For Baraldi et al. (2019), artifacts can play four relevant roles in supporting the process of creating a stabilized network around a central idea: (1) representation, indicating how artifacts can carry the message to a broader audience, to reduce uncertainty and increase its legitimacy; (2) acceleration, as artifacts can enable faster creation of social relationships, convincing partners with a successful proof of concept, and can also increase the firm's self-confidence; (3) translation, when artifacts lead to unintended consequences or changes in the connections that maintain the network of actors; and (4) structuring, as constant modifications of the main artifacts make them mutually adapted to a stable structure (Baraldi et al., 2019).

Chowdhury (2017) relates ANT principles to the emergence of information and communication technology artifacts. ANT describes how actors: a) form alliances, b) involve different actors and use non-human actors to strengthen these alliances and secure their interests. Therefore, ANT can be helpful to overcome the little importance given to artifacts in a network, as it considers that there is a lack of understanding about the electronic services made possible by the digitization of physical products (Chowdhury, 2017).

Introducing an initial relationship between the concepts of Actor-Network Theory with Service Design, it becomes clear that in addition to human actors (stakeholders), non-human elements such as platforms, technology, products, and systems play a crucial role in delivering quality services. Just as human actors need monitoring in their service activities and provision of services, with constant training, a service platform also requires monitoring with updates, corrections, and verification of failures. For Baraldi et al. (2019), creating a network of actors requires extensive "translations" of ideas, material objects, and the interests of the actors involved. Thus, the dynamic relationship between different actors in a network can be explained by the translation concept of Actor-Network Theory.

2.3.1.2 Networks translation and coordination process

Chowdhury (2017) explains that the translation process in the Actor-Network Theory is defined as the method by which the main actor enrolls other actors to form a network. During this process, there is a typical progression in the interactions between the promoters of an idea and the other actants, forming a chain of translations needed to build a network of actors (Callon, 1986). The translation process can be understood in four phases: (i) problematization, (ii) interessement, (iii) enrolment, and (iv) mobilization. These four moments can overlap, in which the actors' identity, the possibility of interaction, and the strategies are negotiated and delimited (Callon, 1986).

In the first phase of problematization, the main actor presents a problem or an opportunity. Then, the main actor persuades other actors in the network to find solutions to the problem and dedicate resources to this end (Chowdhury, 2017).

Each entity listed by the problematization can undergo integration to the initial plan or, conversely, refuse the transaction, defining its identity, objectives, projects, orientations, motivations, or interests in another way. The situation is never plain, as actors' identities and goals are formed and adjusted only during action (Callon, 1986).

The second phase of *interessement* consists of a series of processes by which the central actor seeks to link the other actors to the proposed roles so that the other actors become interested in the proposed solution and change their affiliations to form a group in favor of the main actor (Chowdhury, 2017). To be interested is to be interposed. To interest other actors is to build devices that can be placed between them and all other entities that wish to define their identities in another way. If the *interessement* phase is successful, it affirms the fundamentals of problematization, interrupting all potential competing associations to build an alliance system (Chowdhury, 2017). As much convincing as the argument might be, success is never guaranteed, as the device of interest does not necessarily lead to alliances, that is, to the actual inscription (Callon, 1986).

The third phase of *enrolment* includes a set of multilateral negotiation strategies, where actors try the strengths of the interest phase to allow them to achieve success (Couzineau-Zegwaard and Meier, 2018). This phase does not imply or eliminate pre-established roles (Callon, 1986).

Finally, the mobilization phase is about finding appropriate representatives as spokespersons for the entire network of actors, capable of adequately representing the collectivity without being betrayed by it. During this phase, the actors' network stabilizes as it becomes a single actor (Callon, 1986).

At the end of these four moments, a restrictive network of relationships is built. However, the consensus and the alliances it implies can be challenged at any time since the network relationship between actors is dynamic (Callon, 1986). Callon (1986) highlights, therefore, that translation is a process, never a complete accomplishment, and that it can fail. Moreover, the notion of translation emphasizes the continuity of shifts and transformations: shifts in goals and interests, as well as shifts in devices, human beings, and inscriptions. Thus, this complex chain of translation indicates, first, that actors' networks do not exist "naturally"; secondly, that there are massive efforts needed to build them and, thirdly, that it is challenging to create a stable network (Baraldi et al., 2019, p.61).

Baraldi et al. (2019) state that the main research themes of ANT are the processes of interaction, negotiation, and translation that create stable structures, in addition to the very dynamics by which these structures become stable. Therefore, although ANT focuses on studying change processes, its fundamental objective is to understand how stability is achieved, as stability in social and human elements is more the exception than the rule (Baraldi et al., 2019).

Law (1992) and Callon (1986) also call the Actor-Network Theory the Sociology of Translation precisely because this process is emphasized in studies of power mechanics and dynamic and unpredictable relationships between actors. Callon (1986) also presents a related principle that he calls “free association.” It indicates that actors cannot be analyzed from a pre-established structure. For Callon (1986), an observer must follow the actors to identify how they define and associate the different elements they build and explain their world, whether social or natural. Therefore, this dynamic interaction between actors with different identities and goals is one of the main points studied by the Actor-Network Theory and is relevant in this research since it contributes to understanding how partnerships between stakeholders are formed in a solution-demand network.

Still considering the four phases of translation, the mobilization between actors alone is not enough to keep the network functioning and guarantee its continuity. Therefore, the importance of a coordination process between actors is considered (Powell, 1991). Thus, Powell (1991) points out two macro models of coordination in terms of the logic of social life and economic activity: coordination of markets and coordination of networks.

Markets, as described in economics, are spontaneous coordination mechanisms that give rationality and consistency to the interested actions of individuals and companies. They are open to everyone, but they do not establish solid or altruistic bonds while bringing people together. In a business transaction, participants are free from future commitments. Markets offer options, flexibility, and opportunity. They are a remarkable device for quick and simple communication. According to this approach, no one must rely on someone else for information, as only prices determine production and exchange. The values of traded goods count much more than the relationship itself (Powell, 1991).

The network coordination model, on the other hand, is a process of adaptation and mutual learning, which affects the structure of networks and the

distribution of forces in the networks. Thus, cooperation is the mechanism by which actors coordinate and adjust their activities in interdependent activities part of the cooperation process (Nascimento, 2001). The concept of coordination implies the harmonization of activities or events that would otherwise be disparate. Without coordination, agents, and agencies with different and potentially conflicting goals will promote chaos and inefficiency (Thompson et al., 1991). If price competition is the central coordination mechanism of the market, trust, and cooperation articulate networks (Thompson et al., 1991). Transactions do not occur through discrete exchanges, as in market coordination, but in networks of individuals involved in reciprocal, preferential, and mutually supportive actions (Powell, 1991).

Finally, Powell (1991) considers it impossible to imagine the exclusivity or supremacy of a model. This author observes that market and network models make it possible to understand the extraordinary diversity of economic arrangements currently found in the industrial world (Powell, 1991). Therefore, it is possible that a service proposal, for example, starts as a conventional market model but migrates to a network coordination model. These models, specifically the coordination in networks model, are of particular interest to understand how interactions between actors in solution-demand networks occur.

2.3.1.3 Interactions between actors in solution-demand networks

Couzineau-Zegwaard and Meier (2018) and Callon (1986) emphasize that the translation process is neither stable nor linear. Whether technical or based on partnerships, the alliances formed can be created and dissolved as the system evolves, and it is necessary to accept a certain level of uncertainty. Furthermore, the network's success is not only due to the role of the central actor. Success involves mobilizing entrepreneurial skills (mentoring) and ensuring the successful integration of the roles of human and non-human actors. Thus, it considers technical and technological elements (batteries, vehicles, communication infrastructure) as actors (artifacts) in the same way as individuals or companies. Therefore, the process takes on a larger dimension: each of the actors, assuming and fulfilling the role and

function assigned to them, is interested in the project's success (Couzineau-Zegwaard and Meier, 2018).

Callon (1999) considers one of ANT's main points to assume a radical indeterminacy of the actor by not being based on any stable theory of actors. The motivations behind their actions cannot be predetermined or predicted. The actors can then, alternately, and indiscriminately, take active positions of engagement or, on the contrary, take positions without initiative and allow themselves to be engaged by other actors. For Law (1992), the character of network ordering is better seen as a verb and not as the *fait accompli* of a noun since these orderings are dynamic and constant.

Granovetter's (1983) work on social network analysis is frequently cited in the study of interactions in actor networks, mainly due to the concept of the strength of ties or bonds. For Granovetter (1983), the degree of network overlap between two individuals varies directly with the strength of the bond between them, which can be measured by combining the amount of time, emotional intensity, and intimacy (mutual confidentiality). The strength of these bonds can be strong, weak, or absent. This author points out that most network models deal with strong ties, limiting their applicability to small and well-defined groups. However, the emphasis on weak ties allows discussing relationships between groups and analyzing segments of the social structure that are not easily defined in terms of primary groups. Thus, through these networks, small-scale interaction translates into large-scale patterns, which, in turn, return to small groups (Granovetter, 1983), as mentioned above.

For Le Pira et al. (2017), having a clear view of the actors involved in the decision-making process and the interactions between them is helpful to separate the tools that can be used to support suppliers and providers in understanding the dynamics of participatory processes and in the representation of the interested parties. Callon (2017) also considers the importance of interactions between actors to result in market arrangements that deliver a solution, product, or service to customers. Thus, in the design phase of a service, several actors, such as researchers and engineers, specialists in industrial property, experienced financiers, traders, and sellers, are willing or not to cooperate in the same project (Callon, 2017). Furthermore, for the author, many different agencies come together at different times and places to get the final and unlikely fit between demand and its unique solution. Therefore, a mercantile arrangement is a device that incessantly organizes this

collective work, made up of meetings and progressive transformations, to end up with a product or service proposed by an agent to another agent who agrees to pay for its receipt and use. The organization of each of these meetings does not happen by chance because, according to the logic of market agreements, it participates in a set of activities whose sole objective is to lead to successful bilateral transactions (Callon, 2017).

Therefore, it is possible to relate the principles of ANT and the idea of weak ties with issues related to innovation (Wynstra, Spring, and Schoenherr, 2014) and the creation of an actors' network that aims to create a new service. For a service design, it is often necessary to form partnerships between actors who are not so close or with few affinities. Service Design constitutes a network of multi-stakeholders, with multidisciplinary actors, in which each one contributes with their area of expertise. Thus, new alliances are formed, initially with weak ties (micro-level), which can evolve into strong ties and expand to the macro level. For Wynstra, Spring, and Schoenherr (2014), cooperation in service triads between the platform provider, service provider, and customer contribute to improving customer value, service quality, and aligning the interests and capabilities of the supplier and intermediary.

2.3.2 Actor-Network Theory Concepts' relation to Service Design

Authors such as Storni et al. (2015) explore the intersection of Actor-Network Theory with concepts from the Design field in different ways. There is a tradition of multidisciplinary design research with contributions from Science, Technology, and Society (STS) studies for these authors. Design is seen as a social and political activity that plays a vital role in the formation of society. Thus, the Actor-Network Theory emerged from a critique of the separations between object/nature and society to a concern to reassemble the social and build a shared world, where democratic, ecological, and political issues that permeate everyday life design and technology are integral parts of it. Batista and Meyer (2018) also point out that the Actor-Network Theory has emerged in discussions in the field of Design, oscillating between theoretical perspective, methodology, framework, or the adoption of specific

concepts. This is mainly due to the non-differentiation between humans and non-humans, an idea in line with current Design studies that understand the irreducibility of the artifact to a secondary role in social construction (Batista and Meyer, 2018).

Thus, from the main points addressed by the Actor-Network Theory, by emphasizing the dynamic interactions that occur in human and non-human actors' networks through the translation process, it is possible to relate these principles to the field of Service Design. As one of those responsible for designing a service or product-service system, designers can be seen as mediators. First, they seek to understand customers' needs and the demands of the various stakeholders involved. Thus, they have the role of synthesizing, translating, and materializing these different contributions, points of view, and interests in the design of a service, with the help of instruments such as touchpoints and blueprint (Moritz 2005), which allow visualizing the relationships established in the project dynamics (Batista and Meyer, 2018).

Therefore, the process of a service project is an ever-changing system, and designers, users, and all other actors involved are also part of this system. For Callon (2017), it is not only the designers and producers who must be recognized with the right to create, but also all the agents who necessarily participated in a coordinated manner in the system's constitution, considering the human and non-human entities that collaborate closely. Considering the stages of the translation process (Callon, 1986), from the moment all actors are engaged or interested, the design context becomes an open space for evolution, uniting social and technical in a non-focused operating system only in being optimized and efficient, but allowing new conditions, interactions, and relationships to emerge (Batista and Meyer, 2018).

For Callon (2017), services can be described as systems that mobilize non-human entities and human beings simultaneously, allowing the realization of particular courses of action that, if the service proves to be of good quality, are successfully conducted to its term. From this point of view, service is no different from traditional material goods. The only difference is that the product is usually reduced to a set of materials, whereas the service consists of a complex arrangement that combines human beings and technical entities. The services and actions they offer, promise, enable and help achieve are more difficult to stabilize and control. The service design must find, from progressive adjustments, a commitment between excesses and lack of discipline, to take advantage of the improvisation and adaptation capacities of living beings, in particular humans, but also non-humans,

while protects itself against deviations, actions of resistance or sabotage which they are also capable of (Callon, 2017).

The principles of Actor-Network Theory can also be related to the idea of value co-creation, present in the Service-Dominant Logic (SDL). For Turetken et al. (2019), to achieve innovations and generate new business, it is necessary to align the efforts and corresponding values of a spectrum of stakeholders who need to collaborate in a common business model, that is, enlist and enroll actors through the process of translation. Therefore, Stickdorn and Schneider (2010) point out the relevance of understanding the value and nature of relationships between people and other people, between people and things, between people and organizations, and between organizations of different types, as understanding these relationships is central to design services. The Dominant Logic of Service emphasizes this interaction of value network partners, as they co-create value through collaboration (Lusch et al., 2007; Prahalad and Ramaswamy, 2004).

2.3.3 Value Networks

Grieger and Ludwig (2018) understand that value is increasingly created in collaborative networks and not in traditional and closed places of specialization. That's why it's important to look at who needs to collaborate with whom to create compelling experiences that will satisfy customers. For Grieger and Ludwig (2018), the value creation paradigm shifted from a single system managing specific stakeholders towards collaboration with several multidisciplinary partners in networks. Within these networks, tangible and intangible resources are exchanged and shared among participants to achieve particular goals, suggesting that the customer is one of many beneficiaries. As a result, all participants create value within the system (GRIGER; LUDWIG, 2018). For Lackzo et al. (2019), when the interests of the stakeholders involved are aligned, and altruistic behavior is supported, the value creation process does not depend only on the skills and resources of the central actor, but it becomes a shared responsibility of the entire network.

Vezzoli et al. (2015) reinforce this idea in the concept of product-service systems, considering them as the result of a value co-production process with the

participation of several partners. The value proposition through products and services encompasses a complex network of suppliers, each with its skills. For Reim, Parida, and Örtqvist (2015), the provision of services adds several new tasks to companies' operations. As a PSS demands new skills and knowledge, it becomes challenging to perform these tasks independently, which requires creating partnership networks and infrastructures. Likewise, Stabauer (2018) considers that the digital economy has provided new ways of creating value and networks between companies and customers. As new technologies, products, and skills are needed to deliver smart services, companies can no longer cover all competencies and facilities in-house. In addition, new technologies allow companies to interact with other actors in new ways (Stabauer, 2018).

Baraldi et al. (2019) consider that in addition to forming partnerships networks when constituting a new service business, its durability depends on monitoring these relationships and creating new connections between them, which reflects the development of the network over time. More precisely, networks are dynamic and develop over time (Baraldi et al., 2019). Stabauer (2018) considers value networks as a critical factor for changing business models in the age of digitization, smart services, and the growing importance of the sharing economy. For this author, it is also essential to understand the role of actors in the network. Companies are faced with a new situation involving other companies, institutions, and customers more than ever in their value creation process, connecting new participants, or reconnecting existing partners in new ways (Stabauer, 2018).

Furthermore, for Stabauer (2018), the shared use of goods is becoming increasingly important today. Especially in the mobility and transport field, interest in shared mobility services is growing. However, these services require new ways to create value, new value networks, and new business models. To be successful in the market and gain a competitive advantage, it is becoming increasingly important to build a solid network of partners (Stabauer, 2018).

Cherubini, Iasevoli, and Micheli (2015) point out that companies from various sectors began to enrich their products by adding services to increase competitiveness. Currently, adding value in many industries occurs through co-creation involving a constellation of actors, such as suppliers, business partners, customers, the community, and even competitors. Also, according to Stabauer (2018), a convincing market offer is only possible by creating shared value and

integrating new partners. These networks consist of other companies and especially consumers, who play a decisive role in creating value (Stabauer, 2018).

Grönroos and Voima (2012) and Vargo and Lusch (2004a; 2017) argue in favor of the Service-Dominant Logic and a customer-dominant logic, suggesting that the customer is not a passive recipient of preexisting value but is always an active creator of value. When defining value creation for a customer as the creation of value in use, one of the premises is that the value in use is generated through a collaborative process of co-creation between the customer and the company (Vargo and Lusch, 2017). In this way, value is co-created by the different actors that make up the demand-solution network.

2.3.4 Value Co-creation in Solution-Demand Networks

According to Boukhris, Fritzsche, and Möslin (2017), in service marketing, co-creation is a central construction of the Service-Dominant Logic (SDL), in which customers are active participants in the value co-creation process. For Chowdhury (2017), co-creation is one of the fundamental premises of the Dominant Logic of Service. SDL understands the value co-created by the service offer and the service beneficiary (customer) through the integration of resources and indicates the need for mechanisms to support the underlying functions and processes (Boukhris, Fritzsche, and Möslin, 2017).

For Grönroos and Voima (2012), although value creation is not explicitly defined, the existing literature on the Service-Dominant Logic generally treats as co-creation the process that includes actions of both the service provider and the customer and possibly other actors. Therefore, providers and consumers are considered co-creators of value. Thus, the notion that all actors, customers, and companies co-create value makes value creation a comprehensive process, with no distinctions between the functions and actions of the service provider and the customer in this process (Grönroos and Voima, 2012). Co-creation, however, only occurs when two or more parties influence or interact. Although there are different perspectives on value co-creation, they all share the notion of direct interaction between suppliers and customers (Zhang, Jahromi, and Kizildag, 2018). For Yin,

Qian, and Shen (2019), still according to the Dominant Logic of Service, value co-creation offers opportunities for collaboration between companies and consumers, so that both (a) benefit from the activity; (b) voluntarily participate in the activity, and (c) recognize their role and the role of the other party as contributors to the customer's practices and processes.

Stickdorn and Schneider (2010) draw a parallel between the relationship of co-creation with the principles of Service Design. According to these authors, co-creation during the design process facilitates a smooth interaction between stakeholders during the actual service delivery – essential for sustainable customer and employee satisfaction. Through co-creation, customers have the chance to add value to service in partnership with the service provider early in the service's development. The more a customer is involved in service delivery, the more likely they are to evoke joint ownership, which, in turn, will result in greater customer loyalty and long-term engagement. Likewise, considering the idea of touchpoints, for Heinonen and Strandvik (2018), interactions and touchpoints between providers and customers can be regarded as places for value creation. As a result, managers pay increasing attention to touchpoints extending beyond key service encounters while also recognizing the customer journey and the extended value creation process. Therefore, value can be created at these touchpoints, considering the process as value co-creation (Heinonen and Strandvik, 2018).

For Lusch et al. (2007) and Prahalad and Ramaswamy (2004), companies gain a competitive advantage by involving customers and value chain partners in co-creation and co-production activities. Thus, the collaborative competence of companies is an opportunity to identify innovative forms of co-creation and increase their competitiveness in providing the service (Lusch et al., 2007).

For Zhang, Jahromi, and Kizildag (2018), the service experience in the sharing economy is co-created through the interactions of suppliers and consumers, and this value co-creation echoes the concept of collaborative consumption (Belk, 2014a; Hamari, Sjöklint, and Ukkonen, 2015). The creation or co-creation of value is the result of consumption. Service consumption occurs mainly during interactions between users and service providers in service marketing theory, so the value is an interactive consumption experience. To apply this logic to the collaborative consumption pattern of a sharing economy, the role of value co-creation is considered in three distinct stages: pre-consumption, consumption, and post-

consumption. Thus, value is a dynamic concept that is often only perceived by customers after consumption. Therefore, the post-consumption stage is necessarily associated with subjective or emotional feedback from customers (Zhang, Jahromi, and Kizildag, 2018).

For Yin, Qian, and Shen (2019), value creation refers to a process in which customers benefit from or experience an increase in well-being. However, while the term creation indicates a positive effect of value on customer experiences, it can also have negative and destructive effects. Yin, Qian, and Shen (2019) thus suggest that researchers also warn against co-creation myopia, as existing research usually overlooks the potential risks of value co-destruction, which may or may not occur due to inadequate resources integration.

2.3.5 Value Co-destruction

Considering the previously discussed customer value and value co-creation concepts, Yin, Qian, and Shen (2019) introduce the related concept of value co-destruction. While most previous studies have focused on the process of how value is co-created, less attention has been devoted to consumers' experience with value co-destruction. For Yin, Qian, and Shen (2019), there is growing evidence that consumers experience negative service encounters in which value is co-destroyed during an interactive process of what should be value creation. Value co-destruction can be understood as an interactional process between service systems that declines at least one of the system's welfare points. Typically, this decline occurs through a service system's misuse of its resources or another system's, accidentally or intentionally. In this case, a service system's integration or application of available resources is considered unexpected or inadequate by the other service system that interacts (Yin, Qian, and Shen, 2019).

According to Yin, Qian, and Shen (2019), the consumer-centered process of value co-creation and co-destruction is particularly relevant in the context of the sharing economy. This is because sharing economy companies offer different value propositions than those in the traditional property market's predominant model.

Moreover, in the sharing economy, consumers access goods and services only temporarily, which is heavily dependent on the Internet (Belk, 2014a).

Yin, Qian, and Shen (2019) argue that sharing economy facilitates intensive interactions between customers and companies (mainly through digital technologies) that can strengthen users' co-creative behaviors. For example, in a highly connected sharing economy, feelings of belonging and reciprocity are developed between customers, contributing to customer return and sustainable and conscientious use of resources, leading to positive value creation. However, on the other hand, sharing economy business models are subject to a greater risk of misuse by users, resulting in the co-destruction of value (Sthapit and Björk, 2019; Yin, Qian, and Shen, 2019).

Discussing value co-destruction in service organizations, Smith (2013) identifies four main themes of organizational resources: people (attitudes, skills, and knowledge); technological (product and system design); organizational (policies and procedures); information (communication systems). This integration of resources is deeply embedded in user practices, such that value co-creation can occur when customer and company resources are successfully integrated during user practices, while value co-destruction can happen when resources are poorly or not integrated (Yin, Qian, and Shen, 2019). Citing a bicycle-sharing service case as an example, Yin, Qian, and Shen (2019) point out that vandalism, misuse, or misappropriation cases break the status of successful integration of resources and cause disintegration due to damage to resources. According to Yin, Qian, and Shen (2019), the important role of user and non-user practices in the peripheral process in value co-creation and co-destruction suggests that service providers should encourage positive support practices to enable the transition from co-destruction to co-creation of value. For example, service providers may offer a credit reward mechanism to recognize customers who engage in voluntary maintenance or send notifications when they find damaged products.

Co-destruction and co-creation can interfere with user experience, perception of quality, and satisfaction when using the service. They can also result in negative or positive word of mouth, both to people close to them and through their evaluation and feedback on social media, an action that reinforces the results of value formation (Sthapit and Björk, 2019), in addition to the presence or lack of trust between the actors in the network of a shared service.

2.3.6 Trust among Actors in a Shared Service Network

For Wang, Lian, and Zhao (2019), the peer sharing economy, exemplified in services such as Uber and Airbnb, played an essential role in the global economy. Different from the traditional rental economy, in the sharing economy, service quality is largely monitored by users through devices that allow them to carry out ratings and provide feedback, in addition to reputation systems. Botsman and Rogers (2010) consider trust among peers to be one of the cornerstones of the sharing economy. Online assessment, feedback, and reputation mechanisms are essential tools by which users can self-police on platforms, maintaining this trust.

Sharing platforms development has contributed to mitigating barriers of trust and reputation that previously restricted sharing activities (Henten and Windekilde, 2016). For Ritter and Schanz (2019), sharing via the Internet is seen as different from offline sharing, as digital technologies have allowed sharing between strangers with confidence, supported by reputation systems available on the platforms.

Chowdhury (2017) further considers ANT's translation concept to understand how different stakeholders (actors) form alignment and co-creation activities. According to this author, successful co-creation depends on the establishment of trust between actors. Therefore, in the interestment phase of the translation process, the central actor must promote confidence in the other actors concerning the business' positive outcome (Chowdhury, 2017).

Liang, Choi, and Joppe (2018) identified two different types of trust when conducting a study related to the Airbnb accommodation-sharing platform. Trust was measured as trust based on the institution (company providing the service) and willingness to trust (trust in people), while satisfaction was explored based on transaction processes and experience. Institution-based trust refers to an individual's perception of the institutional environment, including its structures and regulations that make them comfortable purchasing through this website. Liang, Choi, and Joppe (2018) suggest that a long-term relationship can be formed when strong trust is established between the service provider and the customer. That is, trust influences customer retention behavior.

Thus, it can be understood that, in addition to perceived quality and positive user experience, trust is another factor that interferes with customer satisfaction and

loyalty in the context of the sharing economy, which contributes to their permanence in the dynamics of the service. Liang, Choi, and Joppe (2018) find that trust, adjusted expectations, and a positive attitude mediate satisfaction and repurchase intention. Additionally, a higher level of satisfaction can increase consumers' trust in a vendor or platform. Thus, Liang, Choi, and Joppe (2018) suggest that trust is a mediator between satisfaction and repurchase intention, fundamental aspects for customer retention and loyalty, and the continuity of a service and its long-term maintenance.

2.3.7 Network Continuity and Adherence

For Hu (2019), today, many companies are established based on the sharing economy. Most of them depend on fundraising, making it challenging to keep the business profitable and survive in the market. Hu (2019) also points out that it is difficult to maintain relationships with customers, as there are many different and creative platforms, and customers are flexible participants. It is not easy to keep them loyal, as they are curious to try other new options. For Laczko et al. (2019), while the number of companies with offers incorporated in the core principles of the sharing economy is growing, many of them end up not having a long life. There, to survive and thrive, these businesses need to capture the value they create (Laczko et al., 2019).

Niemimaa et al. (2019) use the term business continuity to broadly refer to a company's socio-technical capacity to support and restore intra and extra-organizational contingencies. Niemimaa et al. (2019) claim that the business continuity literature has roots that go back to the 1970s research on disaster recovery plans, expanding this scope to include business processes. However, in place of a broader scope, process approaches are essentially about preparation. Preparation involves integrating redundancy into critical business processes and the resources needed to run those processes to increase their resilience against contingencies. For Niemimaa et al. (2019), however, these approaches are reactive in that they focus on anticipating failures rather than actively and continually avoiding failures. Proactivity, therefore, is crucial to effective continuity.

For this, Niemimaa et al. (2019) propose a Business Continuity Management (BCM). It is an attempt to provide a holistic approach to proactively managing incident preparedness and response. The objective is to prepare organizations for all types of contingencies, although technological incidents are the priority in the contemporary context. It considers that without continuous maintenance and updating processes, plans are usually out of date and do not provide significant support for recovery (Niemimaa et al., 2019).

Baraldi et al. (2019), commenting on continuity and stabilization mainly in startups, affirm that continuity should consider the network incorporation process, including the three periods of establishment, consolidation, and stabilization. These authors relate this issue to the concepts of Actor-Network Theory (ANT), stating that even though ANT is more concerned with studying change processes, its real objective is to understand how stability is achieved since it is easier to find instability than stability in social and human elements. Thus, the actors' network stabilization can be considered a factor related to service continuity (Baraldi et al., 2019).

Laczko et al. (2019) consider that in an actors' network that is part of a sharing economy business, it is up to a central actor to increase the viability of a platform with multiple stakeholders. Likewise, for Lusch et al. (2007), the actor who acts as a network supplier has the role of integrator of the other actors in a value network. This idea is in line with the principles of Actor-Network Theory. Callon (1986) considers that in an actors' network, a central actor has the role of enlisting and inscribing other actors in the dynamic network and aligning and articulating the interests of all actors involved. However, in this space of value co-creation, the central actor has partial control over the experience environment and the constituted networks (Prahalad and Ramaswamy, 2004).

Laczko et al. (2019) present two terms related to network continuity: platform stickiness and platform profitability. The attractiveness and value of the platform in the sharing economy increases with the number of users – the more people who use a service, the more people join. As a result, this increases the platform's grip. Laczko et al. (2019) establish the term platform stickiness (platform adherence) to refer to the central actor's ability to continually attract new actors and keep existing stakeholders on a platform through effective orchestration of value co-creation. Continuously increasing platform adherence is essential to retain stakeholders better and reduce the likelihood of switching or shifting to other competitors. Laczko et al.

(2019) also point out that it is challenging to retain participants if the platform does not continually offer something new and of value. Once the platform's offer becomes static, it can be copied by a competing platform. Therefore, it is the role of the central actor to continuously attract and articulate diverse stakeholders to extend the platform's value, keeping it attractive.

Another term presented by Laczko et al. (2019) is platform profitability, which refers to the ability of the central actor to develop new processes that continuously increase its value capture opportunities. To increase the platform's profitability, the central actor needs to be able to capture enough value from its stakeholders. Therefore, stakeholder profitability is related to the central actor's ability to capture the value it enables and creates for the involved actors (monetary and non-monetary values).

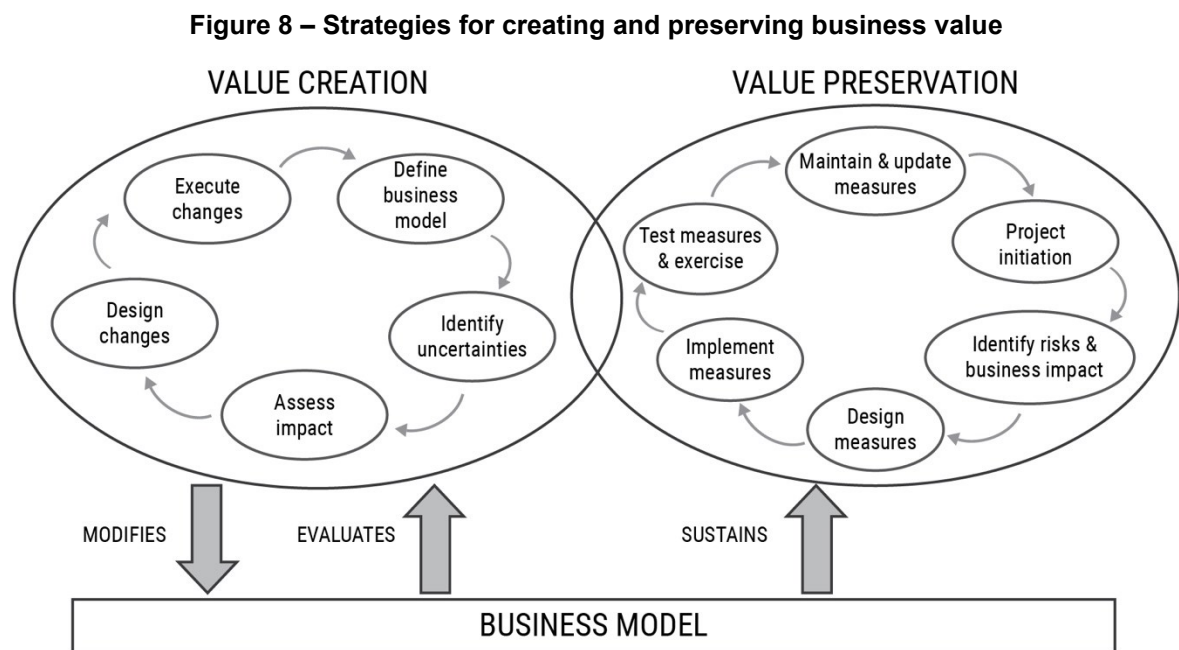
According to Laczko et al. (2019), understanding these two factors is critical to understanding what motivates stakeholders, why they remain with the central actor (adherence to the platform), and how the central actor can capture value from multiple stakeholders (platform profitability). Thus, how the central actor balances these two goals (platform stickiness and platform profitability) over time generally determines long-term success (Laczko et al., 2019).

To practically establish this relationship between adherence and profitability, Laczko et al. (2019) identified eight value generation mechanisms that shape and directly affect platform adherence and stakeholder profitability. One is the ability of the central actor to align stakeholder interests. Another is the platform's control, considering the operational control, the daily management of the service, and the strategic management of the platform. The focus is to maintain long-term viability, balancing supply, demand, and stakeholder integration. For Kumar, Lahiri, and Dogan (2018), long-term business success in the sharing economy through the service facilitator rests on the balanced acquisition, retention, and recovery of service providers and customers. Thus, successfully integrating the actors' network across the entire market (suppliers, consumers, companies, service providers) is the key to a platform-based business model success (Laczko et al., 2019).

In this way, the central actor must be able to identify with other actors in the network, the consumers' demands, designing solutions that meet these demands, or adapting existing solutions to new specified needs or pointed out by consumers. Therefore, in a solution-demand network, it's not just the providers or developers who

create and offer a service, but the users themselves can provide insights through their feedback and evaluations so that the network is constantly improving.

Returning to the term business continuity, cited by Niemimaa et al. (2019), these authors point out that research aimed at business continuity has essentially focused on preserving value – on ensuring the continuity of measures that implement the current business model. However, responding to contingencies often requires not just incremental changes. Thus, these authors also suggest value creation strategies, in which the business model itself is analyzed, reconsidering as a whole what the company is actually doing and rethinking what business it actually operates. Figure 8 presents a diagram showing the importance of value creation and preservation strategies.



Source: adapted from Niemimaa et al. (2019).

Thus, we highlight the importance of the relationship between the actors in the network to contribute to the continuity of the service network. These aspects are also present in the dynamics of PSS solution-demand networks and shared mobility services, as explained in the following sections.

2.3.8 Shared Mobility Services Solution-Demand Networks

Somers, Dewit, and Baelus (2018) surveyed the main actors involved in sharing economy product-service systems: suppliers, consumers, organizations responsible for the sharing platform, investors, lawyers, and government. Regarding the design and development of a successful PSS system, there are more interested parties aligned, such as society, information, and communication technology unit, graphic or industrial designers, application developers, and (micro) entrepreneurs, to implement the concept and marketing. Each of these stakeholders can be mapped concerning their involvement with the PSS. By doing this, four levels arise (Somers, Dewit, and Baelus, 2018): (i) users, (ii) ecosystem, (iii) organization, and (iv) society.

Boukhris, Fritzsche, and Möslein (2017) consider the notion of the term stakeholders to be limiting, especially with the rise of digital and connected environments, in which objects are acquiring sensory processing and communication resources that allow them to carry out activities without community intervention. Boukhris, Fritzsche, and Möslein (2017) then adopt the term actants, coined by Latour (1996), which points to entities capable of performing activities that are a sequence of physical and non-physical actions. These actors, objects, people, or groups have goals achieved by carrying out various activities. Thus, for Boukhris, Fritzsche, and Möslein (2017), a product-service system results from the interaction between different actors and technological elements during the use phase. This means that the design activity must emphasize aspects of convergence between various social and technological factors to realize the features and flows of events (Boukhris, Fritzsche, and Möslein, 2017).

Grieger and Ludwig (2018) explain that the actors of a product-service system can be dimensioned as physical service providers (for example, mechanics) and digital service providers (for example, sharing platforms), which can be individuals, organizations, or the general public. For Vezzoli et al. (2015), PSS offers are more focused on the context of use because they don't just sell products: they open or extend relationships with the end-user. This should trigger greater involvement of local rather than global stakeholders, promoting and facilitating the strengthening and prosperity of the local economy. Finally, as PSS are more labor

and relationship-intensive, they can also increase local employment and consequent dissemination of skills (Vezzoli et al., 2015).

For Ferrero et al. (2018), shared mobility services involve creating a complex system formed by different actors, including companies, public authorities, municipalities, and citizens. Ambrosino et al. (2016a) point out that this scenario requires strong coordination and interoperability between different mobility services, cooperation between the various actors and stakeholders involved in the transport network, and the integration of information, systems, and operations in a clear structure of policies and organization.

Authors such as Chowdhury (2017) and Couzineau-Zegwaard and Meier (2018) relate the four phases of Callon's (1986) translation process in the study of shared mobility services. Thus, in a shared mobility system, there is usually a central actor who declares its intentions, positions itself as a support point for the problematization, and assigns roles to different stakeholders in the sector by forming partnerships with other companies, seeking to align the interests of creating a stabilized network. Thus, the network consists of equipment manufacturers, energy suppliers, technology solution providers, local politicians, batteries, charging terminals, the vehicles themselves, and platforms that allow their shared use (Chowdhury, 2017; Couzineau-Zegwaard and Meier, 2018).

For Grieger and Ludwig (2018), vehicles are no longer considered isolated tangible goods but objects that integrate different stakeholders, devices, functions, and data in coherent value co-creation systems. For Dowling, Maalsen, and Kent (2018), carsharing reveals a reconstitution of motoring, as it works against the infrastructure and culture of dependence on private cars. Thus, car sharing involves the production and negotiation of hybrid forms of ownership. Furthermore, the distinctions between public and private, shared, and individual, mass, and personalized are overlapping. In conclusion, sharing needs to be thought of as a practice woven from the socio-material relationships of the city (Dowling, Maalsen, and Kent, 2018).

Likewise, Dowling and Kent (2015) suggest that carsharing can be understood as a social practice characterized by a distinct set of materials, meanings, and skills. Materials include technologies such as the smart card system often used to lock and unlock the car, as well as the built environment, including the highest residential and commercial densities, active transport networks, and

restricted on-street parking that allow carsharing to work. In terms of meanings, carsharing, with its reliance on digital technologies and futuristic images, embodies connotations of technological advancement and mobility innovations. Instead of the implications of freedom previously associated with the autonomous mobility of the privately-owned car, freedom, for an increasing number of people, derives from the absence of ownership and commitment (Bardhi and Eckhardt, 2012).

Thus, it is possible to relate the concept of solution-demand networks with the new shared mobility services, including Uber, a ride-hailing application. The emergence of Uber was due to the identification that the demand of users was not for cars but mobility solutions. Thus, the platform developers adapted an existing solution, the conventional taxi service, to a new demand, allowing the development of new mobility alternatives (Uber Newsroom, 2020). In this way, passengers can request transport on demand according to their travel need, the amount they are willing to pay, type and size of vehicle, including not only cars, but also providing bicycles and electric scooters. Likewise, as customers used the platform, the company identified other demands and created new solutions for not only moving people, but also for delivering and receiving food and parcels, in modalities such as UberEATS and freight services (Uber, 2020).

In addition, Uber is an interesting case of user experience. It constantly receives and applies customer feedback on continuous improvements and constant implementations, whether in the application itself or the platform's operating system, paying attention to passenger users and receiving feedback from driver users. Thus, the platform, acting as a central actor, seeks to mobilize and coordinate its actors to ensure its maintenance and continuity (Chowdhury, 2017; Couzineau-Zegwaard and Meier, 2018).

Therefore, emerging shared mobility services, such as carsharing, depend on a vast network of actors to guarantee their design, implementation, and maintenance. The following subsection deals with some of the main shared mobility services and their implications, as it is the object of study of this thesis.

2.4 SHARED MOBILITY SERVICE NETWORKS

Shared mobility is the shared use of a vehicle, bicycle, or other means that allows users to have short-term access to modes of transport on demand (Shaheen, Chan, and Micheaux, 2015). It can also be described as a group of shared services in which members or users can benefit from short-term access to transport options whenever they need it (Wielinski, Trépanier, and Morency, 2017). It includes carsharing, bike or electric scooter-sharing, ride-hailing, or ride-sharing services (Stocker and Shaheen, 2017). Shared mobility has gained much interest in recent years, mainly due to new mobility services that address environmental, economic, and urban concerns (Wielinski, Trépanier, and Morency, 2017).

This section addresses a brief context of the emergence of these shared mobility services, mentioning examples considered as some of the most promising business models within the sharing economy (Wang, Lian, and Zhao, 2019). The section concludes with an emphasis on aspects related to carsharing services. The presentation of these concepts supports the case study analysis carried out following this research.

2.4.1 Environmental and Urban Context of Shared Mobility

According to Morton (2018), the global urbanization rate is expanding rapidly as an increasing proportion of the population lives in cities. As a result, the urban transport system suffers from increasingly worse consequences of low levels of air quality, high levels of congestion, and noise, which mainly result from the use of private motor vehicles to meet mobility needs. In addition, Willing, Brandt, and Neumann (2017) and Glotz-Richter (2016) also cite reinforced problems, such as the physical limitation of public space on the streets and the lack of parking spaces which result in more congestion and, consequently, in the increased pollution.

For Zhou et al. (2017), numerous resources in modern society are underutilized, especially in the transport sector. Ownership of private vehicles dominates the set of mobility options, despite a typical car remaining unused for

approximately 95% of the day. However, recent advances in transport technologies and services, such as the emergence of shared mobility services, the invention of connected and autonomous vehicles, and the commercialization of electric vehicle technologies, have profound implications for behavior patterns in transport and territory use (Vij, 2019).

Morton (2018) highlights that greater attention is being paid to the design, operation, and management of urban transport systems to address the problems that the system faces. For Lagadic, Verloes, and Louvet (2019), the ambition to use cleaner energy for transport has become a necessity. Shared mobility services offer a promising solution to the climate emergency: with the potential to limit the ownership of private cars, but also to improve air quality and free up public space for bike paths, public transport, pedestrian areas, and amenities, the shared cars represent a lever to work towards multimodal and greener cities (Lagadic, Verloes, and Louvet, 2019).

On the other hand, Csonka and Csiszar (2016) consider that the development of information technology provides significant support for new modes of travel. Likewise, Vecchio and Tricarico (2019) point out that while societies are increasingly mobile and interconnected, new information technology tools are becoming more and more relevant for getting around and carrying out tasks, even at considerable distances. Therefore, the recent innovation introduced in the market by mobility through apps, social networks, and shared economy initiatives affects the economic appeal of urban areas and people's mobility choices and preferences, proposing new forms of urban consumption (Vecchio and Tricarico, 2019).

Currie and Merket (2016) point out that in the future, providing micro-level personalized transit services is seen as a likely outcome to understand the needs of users better and meet them with more efficient and simplified responses. For Sopjani et al. (2019), innovation in mobility through electric vehicles and shared mobility services is one of the means to achieve a transition to sustainable transport systems. Mobility, however, involves more than product-service systems, as it also incorporates the practices of travel, infrastructure, and mobility cultures. Additionally, changing mobility patterns is strongly linked to user behavior and practices (Mont, 2002). The challenge of transitions to low-carbon mobility is, therefore, not only to look for an innovative vehicle and service design but to explore how these innovative

solutions allow users to change their travel practices and be receptive to the use of new models (Sopjani et al., 2019).

For Inturri et al. (2019), public transport has the potential to be a mode of transportation with less urban and environmental impact, as it traditionally uses high-capacity vehicles to meet high-density and high-demand corridors. However, these services typically have a fixed route and scheduled transit, resulting in a poor quality of travel experience, particularly in low-density urban areas with weak and dispersed transport demand. In these cases, one of the only alternatives is the massive use of private cars, with meager occupancy rates. For Gilibert, Ribas, and Rodriguez-Donaire (2018), as public transport cannot always meet all travelers' needs, there is an opportunity for shared mobility services to reach areas not yet covered by public transport, in addition to better serving the needs of multimodal passengers.

Furthermore, to Acquier, Carbone, and Massé (2019), studies have already shown how carsharing initiatives tend to reduce ownership of private cars, discouraging the purchase or replacing private ownership, with each carsharing vehicle being able to reduce from 9 to 13 personal vehicles in circulation (Martin and Shaheen, 2016). Acquier, Carbone, and Massé (2019) therefore reinforce how the development of shared services and infrastructure can be part of a city's innovation strategy, paving the way for partnerships between public and private actors.

Vecchio and Tricarico (2019) also comment that travel patterns in urban transport are changing. When observing most young people between 18 and 29 years old, the use of individual motorized transport modes is decreasing, while the option for public, shared, and non-motorized transport is increasing. For Willing, Brandt, and Neumann (2017), new mobility services, such as paid ride services, car, and bicycle sharing, already offer more flexibility for travelers and passengers. These developments were accompanied by a shift in consumer preferences and behavior, as the millennial generation increasingly values access rather than ownership (Rifkin, 2001). Consequently, owning a car is constantly losing its appeal, especially for young people living in large cities (Bardhi and Eckhardt, 2012). This traditional mobility paradigm is gradually being replaced by new models of shared mobility, which are representative of the rise of the sharing economy and collaborative or access-based consumption (Belk, 2014a).

2.4.2 Main Shared Mobility Services

A decade ago, shared mobility was just a niche market, and today it is embedded in a multitude of services worldwide. Therefore, there is still no consensus in the scientific literature about its limits, with some covering traditional car rental and others emphasizing the importance of digital applications (LESTEVEN; LEURENT, 2016). For Alemi et al. (2018), the combination of information technologies with the sharing economy has contributed to the emergence of new transport services, thanks to the increase in online connectivity and the changes associated with individual lifestyles. Moreover, these technologies contribute to increasing the success rate and potential market of emerging transportation services by improving the convenience of arranging travel or booking a reservation, providing online payment-for-service methods, collecting, and disseminating customer feedback, and supplying better platforms for dynamic resource management (Alemi et al., 2018).

According to Ambrosino et al. (2016b), the traditional contrast between collective and individual transport solutions is gradually fading into a service-sharing economy where new ways of providing transport services and the concept of mobility as a service are multiplying alternatives to transport offers. Carsharing schemes offered by companies such as Zipcar, dynamic ride-sharing services such as BlaBlaCar, and ride-hailing services such as Uber and Lyft are examples of a new flexible mobility complementary offer. These schemes' continuous and growing success shows that these services can be considered integral to genuinely intermodal urban mobility (Ambrosino et al., 2016b).

For Spurlock et al. (2019), shared mobility helps passengers meet their mobility needs without relying on personally owned vehicles. For example, car-hailing services allow users to request a driver and car for a trip from any origin to their destination via a smartphone app. Traditionally, this passenger transport service is provided by taxi fleets, but newer options such as transport network companies (e.g., Uber and Lyft) try to offer their services at a lower price and with more convenience through their applications, which has increased the impact and use of shared mobility. On the other hand, carsharing allows users to drive, for short periods, vehicles that are shared with other users through a service (Spurlock et al., 2019).

Shared mobility services are more common in urban areas, where they can be used with other transport options that allow their greater adoption. Shaheen and Chan (2016) point out that shared mobility has increased in cities as an innovative mode of transport that enhances urban mobility and as a potential solution to address first and last mile² connectivity with public transport.

Thus, some of the leading and most used shared mobility services are: carsharing services (Spurlock et al., 2019), ride-hailing, online car-hailing, ride-sourcing, on-demand ride services, vehicle-for-hire, pointed out by authors such as Contreras and Paz (2018) and Rayle et al. (2016); ride-splitting, cited by Spurlock et al., 2019, and the paid ride-sharing or carpooling services (Stocker and Shaheen, 2017). In addition to these, there are also bike sharing and scooter-sharing services (Chiariotti et al., 2018). Moreover, in the context of urban mobility, other services can be considered new possibilities for integrating different modes of transport, such as the concept of multimodal mobility and Mobility as a Service – MaaS (Kamargianni et al., 2016).

For Wilhelms, Henkel, and Falk (2017), carsharing is an especially appropriate context for studying collaborative consumption services because it is one of the ways of sharing with more available information, encompassing research carried out in various fields, such as consumer behavior, transport research, and market feasibility studies. Currently, an increasing number of specific companies and automakers are adapting their businesses to offer carsharing services. The following subsection deepens this type of service, as it is this thesis object study.

2.4.3 Carsharing Services

Carsharing is a short-term car rental service that offers consumers access to a private vehicle when and where they need it, without the costs associated with ownership or maintenance (Stocker and Shaheen, 2017; Couzineau-Zegwaard and Meier, 2018). Although carsharing has existed in different forms since the early days

² Term adapted from logistics, indicating the first or last mile traveled by merchandise or passenger to reach its destination (Alemi et al., 2018).

of the automobile, it has only become widely available as a means of transportation since 2000, made possible in large part via the Internet (Vij, 2019).

The main objective of carsharing is to provide individuals with a mobility solution that requires lower liabilities and associated costs less than vehicle ownership, such as initial acquisition cost, fuel, maintenance, and insurance (Zhou et al., 2017). Users can access vehicles belonging to carsharing companies as part of a shared fleet as needed, featuring B2C models, or sharing cars directly with other owners in P2P cases. Members generally pay an initial or annual membership fee and usage fees by distance, hour, or a combination of both (Stocker and Shaheen, 2017).

Carsharing fees are generally calculated based on time and distance traveled (Lagadic, Verloes, and Louvet, 2019), and rates include fuel, insurance, and maintenance. As a result, rates are generally higher than a traditional car rental scheme. These different pricing systems are a direct consequence of distinct value propositions: while the standard car rental scheme is designed for more extended uses, lasting at least one day (e.g., tourist use), carsharing is considered a daily mobility solution, such as public transport (Shaheen, Chan, and Micheaux, 2015).

Zhou et al. (2017) point out that in carsharing, vehicles are shared among a large group of users but are reserved and used by only one user at a time. Thus, carsharing is different from carpooling, which refers to a paid ride service between users. Couzineau-Zegwaard and Meier (2018) also explain that carsharing should not be confused with ride-hailing through applications such as Uber. In this case, the platform connects passengers and drivers to provide transport services and not use of the car itself. In carsharing services, the user is also the driver who uses the vehicle (Dowling, Maalsen, and Kent, 2018).

Wielinski, Trépanier, and Morency (2017) point out that as with bike sharing, carsharing has increased in popularity in recent years, with more than 4.8 million members in more than 1,500 cities sharing more than 104,000 cars in 2014. Carsharing stands out for a service that provides a great commitment compared to other traditional modes in terms of flexibility and distance. In addition, carsharing is cheaper and more convenient than car rental for medium-sized travel, more convenient than public transport, where it is less well served, and more affordable than a taxi for longer journeys (Wielinski, Trépanier, and Morency, 2017).

Different authors highlight some of the main benefits and advantages of carsharing. Among them are reducing costs (acquisition, insurance, fuel) and the convenience of carsharing services having exclusive parking spaces, as these usually are limited to conventional cars in large urban centers (Shaheen, Chan, and Micheaux, 2015). Furthermore, for Zhou et al. (2017), carsharing programs have the potential to complement and encourage the use of other modes such as public transport, bicycles, and walking, in addition to improving mobility options for community members to reach destinations inaccessible by public transport (Ferrero et al., 2018).

Wilhelms, Henkel, and Falk (2017) show that environmental benefits are not the main reason for using carsharing, being seen as a by-product of sharing. However, although ecological benefits are not the primary motivating factor for use, Shaheen, Chan, and Micheaux (2015) point out that studies on carsharing in Europe indicated that the average carbon dioxide emissions of the carsharing user were reduced by 39 to 54%. In addition, the carsharing model showed that each carsharing vehicle minimizes the need for 7 to 10 private cars in Australia, 4 to 10 cars in Europe, and 9 to 13 cars in North America, as many users have even postponed or eliminated the need to purchase a private vehicle (Shaheen, Chan, and Micheaux, 2015; Silva, 2019).

As carsharing emerges as a predominant alternative to mobility, competition between different actors increases, as is the motivation to search for further development of services and sources of differentiation among new competitors (Perboli et al., 2018). Examples are the vehicle manufacturers themselves, adapting their businesses to provide carsharing services and seeking new channels to market their cars (LESTEVEN; LEURENT, 2016).

According to Terrien et al. (2016), there are several operating models of carsharing systems, which vary according to the target audience (B2C, P2P, or B2B) and the process of picking up and returning vehicles (round-trip, one-way station-based; one-way free-floating). The following subsection details these modalities.

2.4.4 Modalities of Carsharing Services

Among the different modalities of carsharing services developed over the years, the oldest model is the round-trip or two-way system, in which the user subscribes to the service and hires a vehicle per hour or per day, usually through a reservation (Vine, Adamou, and Polak, 2014). The car is picked up at a pre-established point by the provider company, a private or public parking lot, and must be returned at the same place after use (LESTEVEN; LEURENT, 2016; Ferrero et al., 2018).

In this model, users typically choose from various available vehicles when making a reservation, comparing a series of attributes that include the hourly price, the distance they must travel to access the car, and the time the vehicle will be available. Depending on the provider, it is also possible to choose between different car brands and models, including combustion, hybrid, or electric vehicles, as well as options with extra passenger and cargo capacities. In this sense, carsharing models are even closer to conventional car rental services, with the difference that the rental can be charged by the hour and not by the daily rate (Zoepf and Keith, 2016).

A more recent development is unidirectional or one-way car sharing: the user picks up the vehicle at one point and can return it at another (LESTEVEN; LEURENT, 2016). This model may have exclusive stations for vehicles (station-based) or newer models that do not use stations (free-floating), where users find the car by GPS on the smartphone and park it wherever they want, within the service area. Often located in dense urban areas, one-way carsharing is mainly used for short trips, both for leisure and transport purposes, where users pay by the minute and do not need to book in advance (Vine, Adamou, and Polak, 2014).

Shaheen, Chan, and Micheaux (2015) point out that in July 2014, there were approximately 17 one-way carsharing operators present in ten countries (Austria, Canada, China, France, Germany, Italy, Japan, Mexico, Spain, and the USA). Today, automakers are dominant in the one-way carsharing industry. The services offered by German and French manufacturers are among the leading one-way carsharing operators.

Despite providing a more flexible service, one-way carsharing presents unique challenges, as its operational management is more complex, such as the

distribution of the fleet in the operating area and parking management. The need to ensure a level of vehicle availability associated with an imbalance between stations can lead to a large fleet and underutilized vehicles (Shaheen, Chan, and Micheaux, 2015).

One-way carsharing services in free-floating mode allow vehicles to be picked up and delivered anywhere within a designated operational area (Shaheen, Chan, and Micheaux, 2015). Free-floating is the latest model of carsharing operation. Cars are parked freely in public spaces within the operational area (the area served by the provider company), and the journey can start and end at any point within the region (Ferrero et al., 2018), with charges per minute of use (Mattia, Mugion, and Principato, 2019). Due to this greater flexibility, many users have preferred this modality, which is why free-floating models had accelerated growth in the last decade and contributed to increasing the attractiveness and competitiveness of this transport modality (Ampudia-Renuncio, Guirao, and Molina-Sanchez, 2018). Glotz-Richter (2016) mentions that the automobile industry operates the most extensive free-floating carsharing services in conjunction with car rental companies, especially European companies.

Lesteven and Leurent (2016) indicate that in addition to round-trip and one-way systems, another modality is point-to-point or peer-to-peer carsharing (P2P). The business model here is different as, in this case, private individuals occasionally rent their vehicles to other individuals, usually through online platforms (Wilhelms, Henkel, and Falk, 2017). There is still little information about mobility practices and the environmental impact associated with this type of carsharing (Shaheen, Chan, and Micheaux, 2015). Regarding privately owned vehicles, it is less likely to include electric vehicles than other types. Peer carsharing networks face the challenge of attracting two distinct customer segments: owners who want to make their cars available to earn extra income and users who want to rent a vehicle belonging to another (Wilhelms, Henkel, and Falk, 2017). Brazil has an expanding example of this modality, which operates in almost all the country's capitals, named mOobie platform (Moobie, 2020).

Lagadic, Verloes, and Louvet (2019) differentiate five primary modalities of carsharing services, according to the target audience and vehicle access mode:

- a) B2C round-trip: Services provided by a company to the general public. In the round-trip model, customers pick up the car in a reserved location, which

may be private or public parking, and must return it to the same place after use.

- b) B2C one-way station: In this case, users pick up the car at a specific station reserved for the company, but they can return it to a different location, as long as it is also an exclusive station of the provider company.
- c) B2C one-way free-floating: in this model, there are no stations. Cars can be picked up and returned at any location, as long as there is a space allowed (if it is on the street) within the service's operation area.
- d) Per-to-peer (P2P): private car owners share their vehicles directly to other users through a platform provided by an operator. The pick-up and return location are previously agreed between the owner and the user, and car access may depend on personal interaction or on a device installed in the car that allows the vehicle to be unlocked.
- e) Business-to-Business carsharing (B2B): fleet of vehicles made available to employees of a partner company, which can be accessed directly or through an outsourced platform.

Hence, carsharing services constitute a solution-demand network formed by different actors, who have different roles and interests to participate in this service network. The following subsection describes the main actors identified in this network.

2.4.5 Actors of the Carsharing Service Solution-Demand Network

From the literature on shared mobility services (Couzineau-Zegwaard and Meier, 2018; Lackzo et al., 2019; Lagadic, Verloes, and Louvet, 2019; Somers, Dewit, and Baelus, 2018), the actors participating in a carsharing service network can be classified into six groups, considering both human and non-human actors:

- 1) Institutional actors
- 2) Suppliers and support providers
- 3) Users or customers
- 4) Service ecosystem

- 5) Public actors
- 6) Society and citizens

The following subsections briefly describe these actors' groups.

2.4.5.1 Institutional actors

The group of institutional actors involves companies (institutions, corporations, organizations), which can be platform providers or vehicle manufacturers. These can also be, in many cases, the providers of shared mobility services, especially carsharing systems.

Lagadic, Verloes, and Louvet (2019) identify four main types of providers: (1) carsharing service providers; (2) traditional car rental companies that have entered the carsharing market; (3) vehicle manufacturers that launched their carsharing system; and (4) public actors (public transport operators or local authorities).

Lagadic, Verloes, and Louvet (2019) state that most of the leaders in the global carsharing market are subsidiaries of traditional car rental groups, as carsharing is a capital-intensive sector that entails significant upfront investments, and these established companies have the financial strength and customer base to launch this service. This fact demonstrates how certain actors enter the field to experiment without having a stabilized business model or profitability expectations. Carsharing can, in some instances, be used as a proof of concept as part of a broader development strategy (Lagadic, Verloes, and Louvet, 2019).

On the other hand, despite being well established in the manufacturing sector, vehicle assemblers can be seen as new entrants to the mobility-as-a-service market. Investing in carsharing is a way for automakers to create a unique bond with a younger customer base, less likely to buy a car, and give visibility to their most innovative products. Although carsharing is beyond the traditional core functions of vehicle manufacturers, they benefit from having advantages that make them competitive in this market, such as: (i) they build and own vehicles that can be easily adapted and made available for the service ; (ii) they have the necessary financial level to bear risks and self-insure, while smaller independent operators generally

have more problems with insurance; (iii) their organizational strengths make them competitive because they already have IT systems, market research resources, brand recognition and vehicle maintenance regimes (Lagadic, Verloes, and Louvet, 2019).

Lackzo et al. (2019) consider that institutional actors are the central actors responsible for orchestrating a sharing economy platform that consists of several stakeholders, both on the supply and demand sides. These stakeholders play different roles within the platform, and generally, their power, behavior, level of influence, and interaction with other actors change over time. Therefore, it is the role of the central actor to ensure the platform's sustainability, continuously developing value-added offers with and for its various stakeholders. The central actor can achieve this by establishing and managing a symbiotic stakeholder network that facilitates exchanges and value creation for all stakeholders (LACKZO et al., 2019).

These platforms not only mediate transactions between various stakeholders but also allow for the creation of long-term relationships between the central actor and the stakeholders and between the stakeholders themselves. This network is dynamic and characterized by continual shifts in stakeholder power, influence, interests, or behavior. It is one of the primary roles of the central actor to accompany these changes, actively managing the stakeholder network. It is the central actor who deliberately develops the platform (i.e., processes and activities). However, the platform continually evolves due to actions, relationships, and interactions between the central actor and its stakeholders and among the stakeholders themselves. While evolution requires the central actor to grant some control over the platform to the stakeholders, the central actor remains responsible for developing and orchestrating all the key processes and interactions that contribute to value creation and capture on that platform (LACKZO et al., 2019).

This idea can be related to the concepts as mentioned earlier of translating the Actor-Network Theory, in which a central actor is enlisting other actors in the network so that everyone goes through the obligatory passage point to organize the relationships between them and ensure that the main objective is achieved (Callon, 1986). For that, the central actor needs to be able to align the interests of the interested parties. Achieving this level of alignment relies on the central actor's ability to seek out and address the joint interests of stakeholders rather than prioritizing one group of actors over another. By increasing stakeholder alignment, the central actor

can establish some form of reciprocal relationship between its various stakeholders, becoming a mandatory crossing point. However, to increase adherence to the platform through this reciprocity, it is imperative that the central actor continually reinforces the altruism of stakeholders, which leads to higher levels of cooperative behavior among actors (LACKZO et al., 2019).

To achieve this fluidity, the central actor needs to be able to empower all stakeholders while maintaining control of the platform. Therefore, it is necessary to establish a technological infrastructure to monitor and optimize all processes. This infrastructure also provides stakeholders with tools and methods to function more independently. For these institutional actors to be able to orchestrate the platform and deliver the service to users, they need to rely on the support of a network of partners, whether technology providers, such as the application, or equipment that are not manufactured by the central company, in addition to providers that provide support services, but often those who have direct contact with the customer (LACKZO et al., 2019).

2.4.5.2 Suppliers and support providers

Considering other actors in a shared mobility service network, Somers, Dewit, and Baelus (2018) identify supporting actors and structures that support the establishment of the platform in its value proposition. These consist of all the people and assets behind the platform, such as legal entities, investors, (micro)entrepreneurs, IT units, including, for example, cloud system and data security and hosting providers, designers, application developers, and intermediates (Somers, Dewit, and Baelus, 2018).

In addition to these, Lesteven and Leurent (2016) call jockeys or valets the actors responsible for carrying out the redistribution of vehicles throughout the service area, as well as taking care of their recharging (when they are electric vehicles, bicycles, or scooters). They are also responsible for the vehicles maintenance and repairs to be in proper condition for the use of customers.

2.4.5.3 Users or customers

Mobility services users, especially members of carsharing services, tend to be individuals aged between 25 and 35 years, employed, most with higher education and university students, with income above average (Zhou et al., 2017). In addition, user profile analyzes show that men have a slightly higher proportion of use than women (Arcidiacono and Pais, 2018). Other studies indicate that users live in the denser or central city areas and usually have a vehicle available to the family, depending on different modes of transport such as public transport, bicycles, and hiking (Arcidiacono and Pais, 2018; Vij, 2019).

In some models of sharing economy services, users can be both consumers and suppliers, as in ride-hailing services such as Uber, where drivers and passengers are platform users (Somers, Dewit, and Baelus, 2018). This thesis, however, focuses on models in which users are consumers of carsharing services, that is, they hire the service and drive the shared-use vehicles made available by the service provider company.

For Somers, Dewit, and Baelus (2018), when discussing users, two characteristics are interesting: the willingness to share and the motivation to participate. Willingness to share is determined by the relationship between a feeling of trust in the system and the presence of a secure sharing environment. Trust in the system can be achieved by integrating a level of transparency made possible by the assessment and feedback systems. A safe environment corresponds to the type of governance present both in the system (performed by the organization) and outside it. Regarding the motivations for participation, satisfaction and economic gains stand out. In this sense, reputation is almost equated with financial gains since reputation is a new type of currency in the sharing economy (Somers, Dewit, and Baelus, 2018).

Heinonen and Strandvik (2018) highlight that customers' behavior has changed, as they increasingly have a choice regarding which suppliers to hire. Although previously users had a passive role, they are now considered active participants, shaping and influencing the outcomes of design and innovation processes (Sopjani et al., 2019). Vendors are therefore facing increasing difficulties with being seen and chosen by consumers. Because of this greater choice

autonomy, suppliers need to understand customers holistically, considering the factors and constraints of each customer (Heinonen and Strandvik, 2018).

Furthermore, Sopjani et al. (2019) point out that since the motivations and preferences of individuals are not homogeneous, not all users act and contribute to the same extent. Thus, relating to the concepts of the Actor-Network Theory, users are relevant actors who can determine changes for suppliers and manufacturers in the network. The market is increasingly working with specific niches, as different groups of consumers have different motivations and interests. One way is to involve user group representatives to understand their demands better (Sopjani et al., 2019).

Arcidiacono and Pais (2018) comment that users are attracted by the flexibility and convenience of shared mobility services regarding access to limited traffic areas or free parking. In some cases, services can even replace car ownership. Furthermore, price is the factor that most affects users' overall satisfaction level. This does not mean that customers opt for the lowest price, but they are looking for options that bring the best cost-benefit ratio with transparent pricing policies (Arcidiacono and Pais, 2018).

Part of the service elements that contributes to a better perception of quality and satisfaction by the customer is related to how the service ecosystem is structured to be delivered. The correct functioning of all the elements present in the ecosystem must be compatible with the user's expectations to guarantee their satisfaction, reuse, and loyalty.

2.4.5.4 Service ecosystem

For Vargo and Lusch (2017), the Service-Dominant Logic considers the term service ecosystems to define a relatively autonomous and self-adjusting system of actors that integrate resources connected by shared institutional agreements and create mutual value through the exchange of services. For Somers, Dewit, and Baelus (2018), the ecosystem is manifested in the platform that supports the service provision. This platform creates a bridge that connects the organization that produces and offers the service with its users, playing a facilitating role. By playing this role of facilitator and intermediary, suppliers and consumers can access skills and

properties belonging to other users through publicly available assessments (Somers, Dewit, and Baelus, 2018).

For Li et al. (2019), the sharing economy service platform charges a fee for facilitating these connections between suppliers and customers. Specifically, the positioning of the service platform is to provide structural support for resource liquefaction and resource density through information technology and thus a valuable co-creation between service providers and customers in a triad relationship.

Couzineau-Zegwaard and Meier (2018) identify the actors involved in electric mobility projects, raising what they consider the classic actors: vehicle manufacturers, battery manufacturers, charging terminal manufacturers, energy companies, institutional actors. In addition to these, in line with the Actor-Network Theory, artifacts are added, forming hybrid actors of the carsharing electric vehicle: the battery, the vehicle, the charging station (Couzineau-Zegwaard and Meier, 2018).

Concerning the sharing economy, three main aspects are essential. First, the organization must enable the infrastructure necessary to set up a work-sharing environment. It can be digital (like the platform) and physical. Second, this sharing environment must be safe for suppliers and consumers to operate. Third, the organization must consider scalability to continuously meet the users' demands (Somers, Dewit, and Baelus, 2018). Therefore, in addition to the platform, the ecosystem is also formed by other non-human actors that contribute to shared mobility services (Couzineau-Zegwaard and Meier, 2018), such as the information technology support network, vehicles, batteries, and charging stations, among other actors. These build the environment and devices that enable the operation and delivery of the service, which often needs to be mediated or facilitated by a partnership with public authorities.

2.4.5.5 Public actors

Vezzoli et al. (2015) highlight the importance of local authorities in developing policies that enable the development and implementation of product-service systems and supporting new networks of actors in the co-production of value. In addition, Terrien et al. (2016) cite the importance of creating public-private

partnerships so that sharing services receive incentives that favor their dissemination and use in urban space.

In a public-private partnership, local governments and companies intend to bring change together. However, each of these actors has different interests related to the value they can obtain from the operation. For instance, public actors want to know how much one-way carsharing can reduce pollution and traffic congestion and increase transport accessibility. In contrast, private actors are encouraged to understand the return on investment of a carsharing service. Thus, it is crucial to understand the actors' motivations to align interests among all actors in the network (Terrien et al., 2016).

For Lagadic, Verloes, and Louvet (2019), an interesting aspect of shared mobility solutions is that several agents, including public and private providers, seek to develop business models that address deficiencies in public infrastructure (streets, parking) and public transport. These problems were historically related to the exclusive competence of local and regional governments. Thus, the development of carsharing services implies a reshaping of the relationship between private service providers, public decision-makers, and public transport companies, as well as a new distribution of roles (Lagadic, Verloes, and Louvet, 2019).

According to Ojasalo and Kauppinen (2016), there is a clear need for different options for public services and their future innovation and production. Public-private partnership is an increasingly popular approach to this end. Collaborative innovation improves general partnership, which in turn can bring multiple benefits to all parties. The parties must understand each other's differences and use them. Meetings should be regular and open to developing trust. Collaboration needs to be nurtured, and there is a requirement for straightforward approaches to innovation through public-private partnerships.

Ojasalo and Kauppinen (2016) point out that some companies may have peculiar attitudes towards city organizations, as they are often seen as less attractive partners for collaboration. Companies may not understand the processes and functionality of a city organization. Also, smaller companies or startups may not be interested in solving problems for cities due to the perception that city processes are too rigid and slow. Companies often don't like that the cities need to follow legislation and policies in their decision-making and operations. However, still for Ojasalo and Kauppinen (2016), through collaborative innovation, the city's role changes from a

buyer to an innovation stimulator and orchestrator. As a result of collaborative innovation, people's attitudes in city government can shift from bureaucratic practices to innovative and experimental approaches, benefiting users of mobility services and the city's entire population.

2.4.5.6 Society and citizens

For Somers, Dewit, and Baelus (2018), society is the most extensive context in which a product-service system operates. Sopjani et al. (2019) consider that city citizens take on the role of co-implementers in addition to the users of a shared mobility service. By accepting and adhering to the new shared mobility proposals, citizens contribute to the network in a collaborative way, helping service providers to increase the number of supporters of the platform, in addition to supporting local authorities to create more sustainable and innovative mobility initiatives for better use of urban space and territory (Ojasalo and Kauppinen, 2016; Sopjani et al., 2019).

Besides, Vecchio and Tricarico (2019) also highlight community groups, both virtual and non-virtual, which can create initiatives based on the sharing and aggregation of information and preferences. The strength of these initiatives derives from the voluntary engagement of people who have common interests, needs, or ultimate destinations. Recognizing the existence of common problems or opportunities, these groups can better face them, not only sharing economic resources but also valuing the information produced by the active participation of individuals in a shared space of dialogue and contextual knowledge (Vecchio and Tricarico, 2019).

Therefore, each of the actors present in a carsharing service solution-demand network has different roles and interests, contributing with their abilities to the continuity of the network. Consequently, there is an importance in forming partnerships between the various actors in the network.

2.4.6 Actors Partnerships in Carsharing Services

Vij (2019) comments that, in several cities in Europe, Australia, and North America, the public sector has actively supported car and bike sharing services, taking on the role of the service provider through government-administered operations or, more often, through public-private partnerships. For Perboli et al. (2018), carsharing companies must establish partnerships with the cities local governments in which they operate to align services with local regulations and establish agreements that guarantee companies driving conditions in the use of public spaces and parking taxation, and other benefits. These agreements must be signed so that strategies and operations are aligned with public stakeholders, negotiating the use of common public parking spaces, the use of public spaces for the construction of fixed stations, and other benefits, such as access to limited traffic areas (Perboli et al., 2018).

Dowling and Kent (2015) argue that local governments can shape carsharing services through parking regulation. For Dowling and Kent (2015), the regulation and success of carsharing services depend on arguments that the carsharing space is not just for the financial benefit of private businesses but for the entire community and local population who will enjoy the associated benefits. Just as carsharing blends an individual practice with a collective practice, parking is shared through subtle redefinitions of public and private (Dowling and Kent, 2015).

Lagadic, Verloes, and Louvet (2019) cite the case of a carsharing service in Madrid, formed by electric and hybrid vehicles that can park for free and travel through the central areas of the city, restricted to electric vehicles, while operators that offer combustion vehicles must pay fees that vary according to the vehicle's environmental performance. This example shows how the government can partner with carsharing operators in a way that benefits the population and the environment as well since the regulations, in this case, apply not only to carsharing vehicles but to electric vehicles in general circulation in the city (Lagadic, Verloes, and Louvet, 2019).

Perboli et al. (2018) cite the cases and examples of some of the leading carsharing service providers in Europe, mentioning their established partnerships. These authors highlight buyer-supplier alliances to ensure a reliable supply of crucial

assets needed for operations. In one example, the carsharing service was a subsidiary company of a vehicle manufacturer, which manufactured the vehicles available in the fleet. Other essential partnerships refer to the technology needed to operate the business, including developing integrated information systems for fleet management, connected to devices installed in vehicles, user registration, the billing process, and other internal activities. In this same example, the carsharing company partnered with a traditional car rental company, which provides the necessary knowledge for fleet management (Perboli, 2018).

Perboli et al. (2018) also consider that carsharing services drive both public and private actors to change, in addition to showing the motivations of each group. According to these authors, private actors seek to improve their service operations to enter new markets continuously. On the other hand, public actors progressively adapt their regulations to meet each city's carsharing requirements, with environmental and policy goals. In addition, public actors need to adapt their organizations to face the challenges of car sharing, which involves many actors who were not used to collaborating before (Perboli et al., 2018).

Lagadic, Verloes, and Louvet (2019) also point out different ways of financing new mobility services by local authorities, such as: (i) providing financial support (subsidies and tax cuts), as in the participation in the development of the recharging infrastructure, in the case of electric cars; (ii) grant service providers differentiated access to parking in public spaces (free of charge or at reduced rates), (iii) integrate the development of carsharing in the urban planning, thinking in advance about spaces for stations and parking spaces, (iv) communicate and promote carsharing to give visibility to the service and encourage its use.

Terrien et al. (2016) agree that breakthrough innovations in passenger transport require effective public-private collaboration. The success of carsharing services results from partnership agreements between private carsharing companies and the local government (Vine, Adamou, and Polak, 2014). Studies on public-private partnerships highlighted critical success factors for their implementation and operations. A key success factor is a stable and lasting public-private relationship that spans more than ten years. However, the public policy literature leaves relatively unanswered how local governments concretely adapt and build long-term relationships with private actors (Terrien et al., 2016). Therefore, understanding the

factors that can lead to the success of carsharing services is essential to contribute to the continuity of shared mobility services.

2.4.7 Carsharing Services Continuity

Lagadic, Verloes, and Louvet (2019) consider that business model innovation is essential for these services to achieve economic sustainability and, therefore, to be maintained over time. Once the value proposition is adapted to an identified demand and a specific urban context, it needs to be constantly re-evaluated to support the growth in the number of users, which implies more investments over time. Lagadic, Verloes, and Louvet (2019) cite the case of a French service launched in 2011 that has long been internationally praised for its electric carsharing system in Paris. However, after years of an increasing number of registered users and decreasing frequency of use, the City of Paris announced the end of the service in June 2018. Lagadic, Verloes, and Louvet (2019) consider that carsharing services generally remain as experimental offers, and even those that operate for a long time can be regarded as experimental projects. There are still uncertainties about how they will fare in the long term, as they have not yet achieved a stable and profitable business model (Guyader and Piscicelli, 2019).

For Terrien et al. (2016), the sustainability of the carsharing services business model depends on the ability of participants to capitalize on their assets during the launch stage. The most critical assets of public and private actors are their teams and collaboration with specific actors. Public and private actors need to acquire experience in the operation of carsharing services and maintain and improve the skills of their teams (Terrien et al., 2016).

Another issue related to the continuity of carsharing services is their profitability. Vij (2019) points out that to guarantee the continuity of shared mobility services, profitability is one of the main concerns, as several carsharing and bike sharing operators were forced to close operations due to financial reasons.

Perboli et al. (2018) mention that even if the revenues of companies providing these services are increasing, profitability is not yet achieved. These authors comment on the example of the German carsharing service, which was once

considered a leader in carsharing services with around 13,000 vehicles and presence in 30 cities between Europe and North America, but which had constant negative revenue and a loss of about 42 million euros in 2014. For Perboli et al. (2018), more attention should be paid to fees and their effects on fees charged to specific customer segments, such as corporate users. This is not a trivial task; in fact, to assess the real impact of a particular tariff on a single type of customer, simulation tools capable of incorporating different sources of information are needed, including socio-demographic data, traffic simulation, and simulation of user behavior (Perboli et al., 2018).

In 2018, two carsharing services belonging to two German automakers merged to form a joint venture with a new carsharing service (Car2go, 2020). However, at the end of 2019, the newly formed partnership announced the end of its activities in the North American continent for the beginning of 2020. The decision was based on the volatile state of the global mobility sector and the increase in infrastructure costs associated with operating a carsharing service in North America, claiming they cannot commit to the required level of investment. Despite announcing the departure of three European cities (London, Brussels, and Florence), the two companies intend to continue their service focused on the European market (Hawkins, 2019).

For Lagadic, Verloes, and Louvet (2019), although the value proposition is innovative, carsharing still needs to find a stable business model. Although most service operators are silent on the subject, the authors' experience in the field of shared mobility research suggests that carsharing is not a profitable business so far. To date, no carsharing service provider has publicly declared and demonstrated the profitability of their service (Lagadic, Verloes, and Louvet, 2019).

For Terrien et al. (2016), given its disruptive nature, it is initially challenging to justify the profitability of innovations in urban mobility. However, studies indicate that a minimum scale of 100 to 200 cars is needed to provide enough data to assess their economic, strategic, and social value. Furthermore, many tangible and intangible benefits are understood during the pilot phase. Therefore, it seems complicated to take a financial profitability approach alone to assess the value of the pilot project. The results indicate that one of the main assets of a pilot project is to allow actors to develop it over time. As a result, stakeholders need to understand

their long-term urban mobility strategy to produce positive marketing, economic and social outcomes (Terrien et al., 2016).

In this matter, compared to the value of attracting new potential customers, the return of already registered customers is essential for long-term survival and profitability (Lee, Lee, and Kim, 2019). Thus, Lee, Lee, and Kim (2019) indicate that examining user reuse and recurrence in carsharing services is significant for the management of service providers. As these are new mobility models, many users will register and use them due to the novelty of the moment. However, one of the factors that guarantee revenue for the service is the return and loyalty of these customers (Lee, Lee, and Kim, 2019).

Therefore, the literature points to different critical success factors for shared mobility and carsharing services. The following subsection lists some of the definitions of Critical Success Factors (CSF), and other critical and relevant elements pointed out in the literature for the success of these services.

2.4.8 Critical Success Factors in Carsharing Services

According to Bullen and Rockart (1981), Critical Success Factors correspond to the limited number of areas in which satisfactory results guarantee a successful competitive performance for an organization. As for Ferguson and Dickinson (1982), CFS are the internal or external factors that must be identified because they support or threaten the existence of a company. Still, Leidecker and Bruno (1984) consider CSF as important and determinant variables for organizational success or failure, consisting of characteristics or conditions that, if adequately supported, maintained, or managed, can have a significant impact on the success of a company that competes in a particular sector (Leidecker and Bruno, 1984). Therefore, based on these definitions, in this thesis, Critical Success Factors are understood as the variables that contribute to the business continuity or the continuity of a shared mobility service by its provider company, precisely, of carsharing services.

One of the critical success factors of carsharing services is the partnership agreements between private carsharing companies and the local government through public-private partnerships (Terrien et al., 2016). Through these

arrangements, private sector management skills and experience are leveraged to deliver public infrastructure projects. For Terrien et al. (2016), this partnership should constitute a stable and long-term public-private relationship (at least ten years) for successful operations.

Another success factor is the appropriate allocation and sharing of risks. Risk allocation involves identifying risks and appropriately sharing the parties (public and private sectors). During negotiations, risks are clearly defined and allocated to the party that has the best mitigation techniques. An adequate mechanism should allocate risks effectively. Governments should refrain from the idea of transferring all project risks to the private sector, as this could affect the progress or future participation of private investors in public-private projects (Terrien et al., 2016).

Lagadic, Verloes, and Louvet (2019) point out that another success factor in carsharing schemes depends on the ability of users to access a variety of transport solutions in the area and the ability to obtain many users for each car, which is related to population density in central urban areas. As these conditions are more challenging to find in peripheral regions, B2C carsharing services generally remain concentrated in the city center. Lagadic, Verloes, and Louvet (2019) cite as an example the failure of a French carsharing. They state that carsharing services are used more intensively when they are readily available, but an increase in the number of users will not necessarily result in profitability because, if there is not a proportional increase and management of the number of vehicles available in the fleet, it makes cars less available to users. Thus, when a user tries to reuse the service and fails due to a lack of vehicles, the user loses confidence in the service and is not quickly restored. Lack of trust in the system can lead to consequences, such as migrating users to competing services and platforms (Kumar, Lahiri, and Dogan, 2018).

In this regard, Ampudia-Renuncio, Guirao, and Molina-Sanchez (2018) reinforce the idea that if users often do not find cars available near their demand points, it is unlikely that they will accept the system as a substitute for a more reliable model. The reliability and quality of carsharing services depend a lot on the cars available at all times; that is, good space availability is a crucial factor for the system's success. From the users' point of view, even when they have already rented a car on an itinerary, the system does not guarantee finding another car on the way to the next activity or home. Customer experience determines their dependence on

the system, so smart relocation strategies are essential and critical success factors (Ampudia-Renuncio, Guirao, and Molina-Sanchez, 2018).

In addition to the number of vehicles available, Mattia, Mugion, and Principato (2019) raise other valuable aspects related to carsharing offers, such as the service coverage area, if the greatest need for transport demand in the city is being covered, in addition to ease of access to the service.

Silva (2019) points out as critical factors related to the business success of business models for carsharing services: the analysis of massive data through Big Data tools, the availability of applications for mobile devices, the implementation of the resources of physical and logical security for users of carsharing services, encouraging online collaboration and the use of social media, and operating in a regulated market. On the other hand, Ferrero et al. (2018) indicate that the success of carsharing services is strictly related to factors such as size of carsharing stations, seasonal impact, age of vehicles and multimodal transport network, that is, the presence of different modes of transport in the vicinity from carsharing stations. These aspects contribute to user satisfaction and intention to reuse the service (Ferrero et al., 2018).

Hence, several authors present their different perspectives concerning critical success factors for carsharing services. Table 6 summarizes these main critical factors mentioned and identified in the literature on shared mobility services.

Table 6 – Synthesis of CSF in carsharing services identified in the literature

AUTHORS	CRITICAL SUCCESS FACTORS FROM THE LITERATURE
Ferrero et al. (2018)	Carsharing services' success is related to factors such as the size of carsharing stations, seasonal impact, age of vehicles, and multimodal transport network, that is, the presence of different modes of transport in the vicinity of carsharing stations.
Huang and Kuo (2020)	These authors propose 26 CSF in the sharing economy. Price transparency, privacy, information accuracy, and legality were considered the most critical success factors.
Lagadic, Verloes, and Louvet (2019)	Possibility of access to a variety of transportation solutions in the area and the ability to obtain many users for each car, related to population density in the central region of cities.
Mattia, Mugion, and Principato (2019)	Utility aspects related to carsharing offers, such as the service's coverage area, if they are actually covering the city's greatest need for transport demand, in addition to the ease of access to the service.
Silva (2019)	Critical factors related to the business success of business models: massive data analysis using Big Data tools, the availability of applications for mobile devices, the implementation of physical and logical security features for users, encouraging online collaboration and the use of social media, and operating in a regulated market.

AUTHORS	CRITICAL SUCCESS FACTORS FROM THE LITERATURE
Terrien et al., (2016)	<p>Partnership agreements between private carsharing companies and the local government through public-private partnerships. This partnership must constitute a long-term stable and enduring public-private relationship (of at least 10 years) for successful operations.</p> <p>Allocation and appropriate risk-sharing: risks identification and proper sharing of parties (public and private sectors). Governments should refrain from the idea of transferring all project risks to the private sector, as this could affect the progress or future participation of private investors in public-private projects.</p>
Vine, Adamou, and Polak (2014)	Partnership agreements between private carsharing companies and the local government.

Source: Own Authorship (2021).

At last, to conclude this literature review chapter, the following section presents an alignment of the main concepts discussed in this Theoretical Foundation chapter to facilitate understanding the relationship between these concepts.

2.5 CONCEPTUAL ALIGNMENT

This section presents an alignment between the sharing economy, Service Design, and solution-demand network concepts, summarized in reference tables and visually synthesized in map.

Industrial-based economic models focused on resource extraction, high rates of consumption, and disposal of goods (Belk, 2007; 2014b; Vasques, 2015) are giving way to a society focused on accessing the use of products instead of their possession (Rifkin, 2001) by the integration products and services offers that can lead to positive economic and environmental effects for industry and society (Mont, 2002).

Among these new models, we highlight the Service-Dominant Logic (Vandermerwe and Rada, 1988; Vargo and Lusch, 2004a; 2017) and product-service systems (PSS) (Goedkoop et al., 1999; Mont, 2002; Vezzoli et al., 2015), in addition to proposals aimed at the shared use of underutilized resources and goods (Sharing Economy - SE). These focus on access to the products' function, a principle also present in functional economy proposition (Gidel, Huet, and Bisiaux, 2016; Stahel, 1997).

Among the various terms related to the sharing economy, the ones closest to this research's aims are collaborative consumption (Belk, 2014a; Botsman and Rogers, 2010; Möhlmann, 2015) and access-based consumption (Bardhi and Eckhardt, 2012), when considering the availability of products through services. The idea of shared use also fits, since access to an artifact can be shared, even if sequential (with more people using the same product) and owned by a company, in which the user does not need to purchase the product to enjoy the benefits of its function. Thus, both profit-oriented and non-profit businesses are considered valid, in addition to the sharing that occurs between peers (P2P), between companies (B2B), and between companies and people (B2C), an idea present in the conceptions of authors such as Muñoz and Cohen (2017) and Kumar, Lahiri and Dogan (2018). Thus, we apply the term sharing economy to encompass these consumption models focused on access to the shared use of a function.

Web 2.0 and new platforms and applications that allow users and companies to share their resources contributed to enabling this access to shared use (Belk; 2014a; Guyader and Piscicelli, 2019; Henten and Windekilde, 2016; Möhlmann, 2015). In addition, sharing platforms allow the performance of improvements for sustainability. However, they must also be designed with this objective (Acquier, Carbone, and Massé, 2019; Bisiaux et al., 2014; Mont, 2002).

The transport sector is one of the most explored in shared use, with growing shared mobility services. Among these services, there is the sharing of bicycles, scooters, cars (electric and conventional), in addition to ride-hailing and ride-sharing services, intermodal integration services, and Mobility as a Service (Alemi et al., 2018; Möhlmann, 2015; Shaheen and Chan, 2016). To contribute to the acceptance, continuity, and adherence of stakeholders involved in these platforms (Baraldi et al., 2019; Laczko et al., 2019; Niemimaa et al., 2019), one of the fundamental aspects is to understand their business models, user profiles (Cheng, 2016; Hu, 2019; LAHIRI; DOGAN, 2018; Möhlmann, 2015), and identify the motivators and barriers to shared use (Acquier, Carbone, and Massé, 2019; Belk, 2007).

It is possible to identify the main actors involved in shared mobility services (Boukhris, Fritzsche, and Möslein, 2017; Dowling and Kent, 2015; Ferrero et al., 2018; Somers, Dewit, and Baelus, 2018) and the need and relevance of forming partnerships to share skills and risks (Ojasalo and Kauppinen, 2016). Also, several authors such as Ampudia-Renuncio, Guirao, and Molina-Sanchez (2018), Dowling

and Kent (2015), Kumar, Lahiri and Dogan (2018), Lagadic, Verloes and Louvet (2019), Silva (2019), Terrien et al. (2016) and Zuo et al., (2019) point out a series of critical success and failure factors in different cases of shared mobility services, which can contribute to various aspects of the continuity of these services.

Table 7 presents the synthesis of these primary elements discussed regarding sharing economy and their relationship with the other significant research areas (Service Design – SD and solution-demand networks – SDN).

Table 7 – Alignment of sharing economy concepts

SHARING ECONOMY (SE)		
FEATURE	AUTHORS	CONCEPTS RELATION
Focus on function, shared access, shared use, and collaborative consumption	Bardhi and Eckhardt (2012); Belk (2007); Bostman and Rogers (2010); Laczko et al. (2019); Mont (2002); Stahel (1997)	SE + SD
Shared mobility	Alemi et al. (2018); Möhlmann (2015); Shaheen e Chan (2016)	SE + SD + SDN
Business model and user profile	Cheng (2016); Hu (2019); Lahiri and Dogan (2018); Möhlmann (2015)	SE + SDN
Motivators and barriers to sharing	Acquier, Carbone, and Massé (2019); Belk (2007); Möhlmann (2015); Zhang, Gu, and Jahromi (2019)	SE + SDN
Critical success/failure factors in shared mobility services	Dowling and Kent (2015); Huang and Kuo (2020); Ferrero et al. (2018); Lagadic, Verloes, and Louvet (2019); Mattia, Mugion, and Principato (2019); Silva (2019); Terrien et al. (2016); Vine, Adamou, and Polak (2014)	SE + SD + SDN

Source: Own Authorship (2021).

Considering that a large part of the access-based consumption proposals is offered in the form of services, the field of Service Design contributes to understanding concepts related to the Service-Dominant Logic (Vandermerwe and Rada, 1988; Vargo and Lusch, 2004a; 2017) and the idea of product-service systems (Mont, 2002); Vezzoli et al. (2015).

Service Design also contributes to understanding the user's journey when using a service and thus understanding their experience (Bitner, Ostrom, and Morgan, 2008; Coxon, Napper, and Richardson SON, 2019; Zhang, Jahromi, and Kizildag, 2018), which can impact satisfaction and loyalty (Cheng, Fu, and Vreede, 2018; Liang, Choi, and Joppe, 2018; Möhlmann, 2015; Mont and Plepys, 2003; Yamada, 2019). In addition, there are several tools adapted from the Design field that allow visualizing, mapping, and monitoring services. Among these tools, we highlight the customer journey and touchpoints map, the stakeholders' map, and the service blueprint (Bitner, Ostrom, and Morgan, 2008; Coxon, Napper, and Richardson, 2019;

Moritz, 2005; Stickdorn and Schneider, 2010). Another aspect related to user experience and their satisfaction is the study of the value perceived by the customer (Gallarza, Gil-Saura, and Holbrook, 2011; Holbrook, 2006), and the study of service quality, with the support of assessment tools and quality monitoring like SERVQUAL, developed and adapted by authors such as Cheng, Fu and Vreede (2018), Cronin and Taylor (1994), Grönroos (1984) and Parasuraman, Zeithaml, and Berry (1985; 1988).

Regarding shared mobility services, in addition to evaluating the quality of the service itself, it is essential to pay attention to the technical and functional aspects of a service, such as ease of use and convenience (Arcidiacono and Pais, 2018), availability of compatible urban infrastructure to provide the service and serve the public in the area of operation (Coxon, Napper, and Richardson, 2019; Reim, Parida, and Örtqvist, 2015), and users' reactions to prices, fees, and familiarity with the service (Möhlmann, 2015).

Authors such as Yamada (2019), Yin, Qian, and Shen (2019), and Zhang, Jahromi, and Kizildag (2018) also point out that currently, users themselves share their user experiences, value perceptions, satisfactions and frustrations with other users, through feedback systems (eWoM) and social media reputation assessment. Companies' actions regarding these assessments can impact users' engagement with a service, brand, or company (HU; 2019; Sopjani et al., 2019). This engagement allows ties to be created with the different service network stakeholders (Baek et al., 2018; Li et al., 2019), contributing to more significant interaction between actors in solution-demand networks (Grieger and Ludwig, 2018; Turetken et al., 2019; Vargo and Lusch, 2017).

Table 8 summarizes these Service Design characteristics and shows its relationship with the other areas studied in this thesis.

Table 8 – Alignment of Service Design concepts

SERVICE DESIGN (SD)		
FEATURE	AUTHORS	CONCEPTS RELATION
Service-Dominant Logic, product-service systems	Mont (2002); Vandermerwe and Rada (1988); Vargo and Lusch (2004a; 2017); Vezzoli et al. (2015)	SD + SE
Design tools	Bitner, Ostrom, and Morgan (2008); Coxon, Napper, and Richardson (2019); Moritz (2005)	SD
User experience	Bitner, Ostrom, and Morgan (2008); Coxon, Napper, and Richardson (2019); Zhang, Jahromi, and Kizildag (2018); Pine and Gilmore (2013)	SD + SDN
Satisfaction and loyalty	Cheng, Fu, and Vreede (2018); Liang, Choi, and Joppe (2018); Möhlmann (2015); Mont and Plepys (2003); Yamada (2019)	SD
Service quality	Cheng, Fu, and Vreede (2018); Cronin and Taylor (1994); Grönroos (1984); Parasuraman, Zeithaml, and Berry (1985; 1988)	SD + SDN
<i>Feedback and eWoM</i>	Yamada (2019); Yin, Qian, and Shen (2019); Zhang, Jahromi, and Kizildag (2018)	SD + SE + SDN
Stakeholder service network	Baek et al. (2018); Li et al. (2019)	SD + SDN

Source: Own Authorship (2021).

Finally, based on some principles of the Actor-Network Theory (Baraldi et al., 2019; Callon, 1986; 1999; Latour, 1996; 2005; Law, 1992), the concept of solution-demand networks seeks to identify and analyze how the dynamics and interaction between actors in a network occur (Callon, 2017; Law, 1992; Batista and Meyer, 2018; Storni et al., 2015; Wynstra, Spring, and Schoenherr, 2014).

One of these aspects is the idea of the relationship between human and non-human actors (Callon, 1986; Latour, 2005; Law, 1992) since sharing economy service proposals are integrated offers of products and services, which depend on non-human elements to operate (Grieger and Ludwig, 2018). Among these non-human actors, platforms, technology, products, and systems stand out as examples that play an essential role in service provision.

Another Actor-Network Theory principle is the translation process (Callon, 1986; Chowdhury, 2017), in which a central actor (like a service provider company, for example) enlists other actors to align their interests and act together according to a common objective, contributing to the coordination and maintenance of the relationship between the actors in the network (Baraldi et al., 2019; Powell, 1991).

The concern with greater user engagement allows service providers to understand the value perceived by the customer (Lee, Lee, and Kim, 2019; Zhang, Gu, and Jahromi, 2019), in addition to the value co-destruction processes (Yin, Qian, and Shen, 2019) that can be detrimental to the continuity of the service (Laczko et

al., 2019). Finally, network interaction between different actors, with their specific skills and knowledge, must consider opportunities for collaboration so that all actors recognize their role and the roles of the other party as co-creators in the solution-demand network (Yin, Qian, and Shen, 2019).

Table 9 synthesizes these elements related to solution-demand networks, pointing out the relationship with the other studied areas.

Table 9 – Alignment of solution-demand networks concepts

SOLUTION-DEMAND NETWORKS (SDN)		
FEATURE	AUTHORS	CONCEPTS RELATION
Human and non-human actors and integrated systems of products and services	Callon (1986); Grieger and Ludwig (2018); Law (1992); Latour (2005); Turetken et al. (2019); Vargo and Lusch, (2017)	SDN + SD
Dynamics and interaction between actors in the network, translation, and coordination process	Baraldi et al. (2019); Callon (1986; 1999; 2017); Chowdhury (2017); Granovetter (1983); Law (1992); Laczko et al. (2019)	SDN
Platform continuity and adherence	Baraldi et al. (2019); Laczko et al. (2019); Niemimaa et al. (2019)	SE + SDN
Value co-creation	Batista and Meyer (2018); Lusch et al. (2007); Prahalad and Ramaswamy (2004); Powell (1991); Storni et al. (2015); Wynstra, Spring, and Schoenherr (2014)	SDN + SE + SD
Value co-destruction	Yin, Qian, and Shen (2019)	SDN + SE
Trust among network actors	Bostman; Rogers, 2010; Chowdhury (2017); Liang, Choi, and Joppe (2018)	SDN + SE + SD
Actors and partnerships in shared mobility services	Boukhris, Fritzsche, and Möslein (2017); Dowling and Kent (2015); Ferrero et al. (2018); Somers, Dewit, and Baelus (2018)	SE + SD + SDN

Source: Own Authorship (2021).

Thus, this research's main context is the transition from industrial economic models, focused on producing and commercializing consumer goods, to new economic models. These are more concerned with environmental impacts, use, and disposal of resources and artifacts, and emerged accompanied by changes in consumption and possession habits, with new generations less attached to material goods and more concerned with access to the function of goods, seeking ease, convenience, and cost savings. Among these economic models, there is a logic focused on the use of products through services (Service-Dominant Logic and product-service systems), and proposals focused on the shared use of underutilized resources and products (sharing economy) and focusing on access to the function that the products provide (collaborative and access-based consumption).

One of the prominent examples is shared mobility, with different modes such as shared bicycles and scooters, carsharing, ride-hailing, and ride-sharing services. These new mobility services have specific business models that vary according to the public (B2C, P2P) and usage model (one-way, round-trip, free-floating). In addition, they have critical factors that can guarantee success and continuity and face barriers to greater dissemination and shared use of goods.

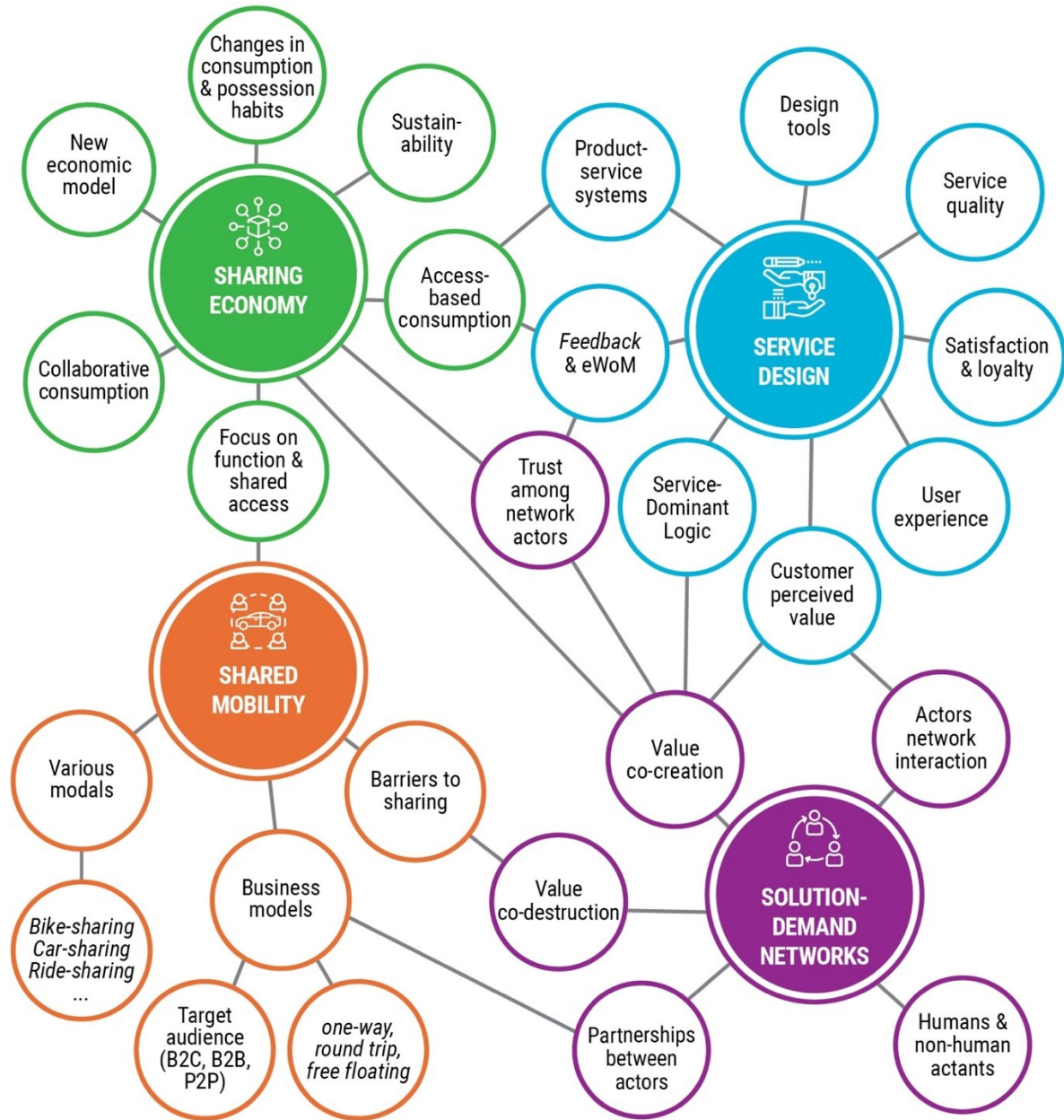
Considering the shared use of products provided by service platforms in product-service systems and the Service-Dominant Logic, Service Design emerges as an interdisciplinary field that involves different areas to build, map and monitor services. With contributions from the Design field, Service Design provides tools that allow to view and evaluate various service issues, such as their technical and functional aspects and the quality of services related to the user's experience, satisfaction, and loyalty.

We still highlight the importance of the customer's role, not only as a consumer but as an actor that contributes to the creation of value in a solution-demand network. In addition to users and customers, a service involves several actors, human and non-human, such as producers, suppliers, operators, the platform itself, product, and ecosystem that allow the service offer. In addition, it is necessary to form partnerships between stakeholders with different skills and knowledge to share risks, assist in collaboration between all actors and contribute to the maintenance and continuity of the network.

Therefore, the relationship between these key concepts contributes to identifying the main critical success factors in operating a carsharing service solution-demand network.

At last, Figure 9 presents a visual map to illustrate and synthesize the ideas and facilitate the understanding of the relationship between all these concepts.

Figure 9 – Visual map of the concepts' relationship in the theoretical framework



Source: Own Authorship (2021).

The synthesis and alignment of these concepts contributed as a theoretical basis for constructing the theoretical-conceptual model, as presented in the next chapter of methodological procedures.

3 RESEARCH METHODS

This chapter describes the methodological procedures applied for this study.

The thesis research can be detailed in three phases:

- 1) Conducting bibliographic research through a systematic literature review, supported by the PRISMA recommendation, to propose a conceptual-theoretical model, through inductive content analysis.
- 2) Case studies conduction by selecting companies providing carsharing services. The data consisted of collecting data published by users of these services on Twitter and Yelp websites, by applying netnographic techniques, and surveying through online questionnaires.
- 3) Comparison between the data collected from the case studies with the proposed conceptual-theoretical model, through deductive content analysis, for the proposition of the final critical success factors.

Thus, following this chapter, the research is firstly characterized, justifying its methodological framework, and presenting its consistency matrix. Then, the main steps outlined for the study operationalization are described, based on the defined methods. Finally, each of these steps is detailed, describing the procedures performed for selecting and specifying the sample, the collection techniques and instruments, and the techniques for analyzing the collected data.

3.1 RESEARCH CHARACTERIZATION

Considering the characterization of the problem and the research purpose, this study is characterized as descriptive. It presents in its general objective the description and verification of associations and the establishment of relationships between variables (Gil, 2010). The research is also descriptive for analyzing a given phenomenon from a theoretical basis, seeking to understand the variables associated with this phenomenon and the perception of a specific population about these variables (Santos et al., 2018).

The problem characterization and research methods selection are influenced by the study's philosophical position (Santos, 2018). Therefore, this research is predominantly phenomenological in the initial stage, adopting qualitative and inductive analysis methods (Lakatos and Marconi, 2003). This interpretive approach is perceived in the literature inductive content analysis procedure and the collection of case study data, as it seeks to identify and understand variables and their nature (Lima, 2011).

In the last stage of the research, the collected data are compared with the theory, based on the proposition of a conceptual-theoretical model. Thus, this stage has a more positivist character in making inferences and in the sense of testing the theory. According to this approach, knowledge is developed from a systematic and rational process (Santos, 2018), which in this research was developed through deductive content analysis technique to interpret relationships between key variables (Lima, 2011).

Thus, the thesis presents a qualitative and multiparadigm approach, adopting a hybrid solution that moves between interpretivism and positivism (Santos, 2018), considering the intersections between the two approaches (Lima, 2011). This is perceived in the way the research starts with an interpretive and inductive approach to understanding the problem and then adopts a deductive approach in making inferences and verifying relationships between variables (Santos, 2018).

Regarding the problem approach by technical procedures, this is qualitative research, as it considers the existence of a dynamic relationship between the real world and the subject, which cannot be translated into numbers, in addition to presenting the process and its meaning as the approach focus (Silva and Menezes, 2005). Furthermore, qualitative research seeks to describe and understand a phenomenon. Thus, its objective is not a generalization but understanding the event and the possibility of comparison with situations in similar contexts (Ollaik and Ziller, 2012). Therefore, qualitative analysis can be developed by a sequence of activities that involves data reduction, data categorization, interpretation, and report writing (Gil, 2010).

As for the selection of the research method, the multiple case study was adopted to understand a contemporary event, in the identification and description of relevant variables about this event, in addition to the characterization of the dynamics of the relationships between them (Yin, 2001).

Nevertheless, it is also usual to adopt a sequence of different research methods during study development to meet the specific objectives outlined (Santos, 2018). Therefore, although the primary research method is the multiple case study, strategies were also adopted that involve the combination of methods, applied at three different times:

- 1) Bibliographic research through systematic literature review and inductive content analysis technique to define a conceptual-theoretical model.
- 2) Conduction of case studies by collecting data from six selected carsharing cases, using netnographic techniques and surveying through questionnaires.
- 3) Analysis of the collected data by comparing it with the conceptual-theoretical model through deductive content analysis.

The case study method is based on multiple sources of evidence to allow its triangulation or convergence at the end of the analysis and to guarantee the reliability and internal validation of the case's interpretation (Yin, 2001). Therefore, data from three different sources were established as units of analysis:

- a) Secondary data from the literature, to build the conceptual-theoretical structure.
- b) Secondary data collected from user publications about carsharing cases on Twitter and Yelp platforms, to understand the perception and experience of consumers regarding the use of these services, through eWoM.
- c) Primary data collected through an online survey to collect opinions and perceptions of different actors (consumers, companies, and public actors) in the shared mobility services network.

As for the typology of data, literature data is considered secondary because they have already been treated (Gil, 2010). Likewise, online publications on case studies, collected on Twitter and Yelp, are also considered secondary sources, as they are already available for other researchers to collect, tabulate, or analyze (Mattar, 1996). Finally, the data collected through questionnaires are primary because they have not yet been collected to meet the specific purposes and needs of the study (Mattar, 1996).

We point out a limitation of the study in considering the perception of only a portion of carsharing services users, who are present and active in the online

environment when commenting on the use of services by electronic Word of Mouth (eWoM), or by answering the questionnaire. Therefore, the perception of carsharing service users who did not share their experience using the online environment was not considered due to the strategy established for data collection.

As for the collecting techniques of these data, bibliographical research was used through a systematic review of the literature to know the state of the art on the addressed topic (Treinta et al., 2013). Furthermore, for the collection of publications from carsharing users on Twitter and Yelp, netnography techniques were adopted through non-participant observation, which deals with using publicly available information online to understand the needs and decisions that influence consumer groups (Kozinets, 2002). Finally, the primary data survey was carried out by sending online questionnaires to three groups of actors (users, companies, and city halls) related to carsharing services. This collection instrument was chosen for several reasons, such as the possibility of reaching more respondents simultaneously, covering a wider geographic area, and faster and more objective obtaining of answers (Lakatos and Marconi, 2003). In addition, an advantage of using online questionnaires in qualitative research is the openness and flexibility to address a wide range of research questions in the field of Social Sciences, as the method allows access to data that vary in focus from the views of people, experiences, or material practices (Braun et al., 2020).

For the definition of data collection and analysis strategies, a research protocol was elaborated, which details all the variables to be considered and outlines the collection instruments and their respective analysis strategies (Yin, 2001). Appendix A presents this protocol.

Finally, for data analysis, categorical and thematic analysis techniques of content analysis were adopted, allowing replicable and valid inferences from texts to the contexts of their use (KRIPPENDORFF, 2004). Thus, content analysis was applied at two different stages.

At first, inductive content analysis was applied to propose the conceptual-theoretical model. This technique allowed identifying the main variables related to the case studies (Elo and Kyngäs, 2008). In a second moment, after field collection of data on the selected cases, another analysis was carried out by comparing the data collected with the conceptual- theoretical model, using deductive content analysis.

Although case study is a method that involves the use of more inductive forms of reasoning, it is also possible to conduct analyses through the deductive method, benefiting from the prior development of theoretical propositions to perform data collection and analysis (Santos et al., 2018). In addition, although the deductive approach has a more systematic character, the case study method prioritizes analytical generalization and not a statistical generalization, as its focus is not on verifying the representativeness of the results of research concerning a population, but rather the validity of a theoretical postulate associated with the observed phenomenon (Santos et al., 2018). Therefore, this research is classified as qualitative.

Table 10 presents the synthesis of the research characterization regarding these different aspects.

Table 10 – Synthesis of the research characterization and methodological framework

ATTRIBUTE	RESEARCH CHARACTERIZATION	JUSTIFICATION
Problem characterization and research objective	Descriptive	Description and verification of associations and relationships between variables (Gil, 2010). Seeking to understand the variables associated with a phenomenon and the perception of a specific population about these variables (Santos, 2018).
Philosophical positioning	<ul style="list-style-type: none"> • Multiparadigm • Transition between phenomenological or interpretive and positivist approaches 	Adoption of qualitative and inductive analysis methods (Lakatos and Marconi, 2003). Deductive analysis technique for making inferences and verifying relationships between variables (Lima, 2011).
Research method	Multiple case study	Understanding of a contemporary event in the identification and description of variables about the event, and characterizing the dynamics of its relationships (Yin, 2001).
Research development strategy and combination with other methods	<ol style="list-style-type: none"> 1. Construction of the theoretical matrix 2. Case studies conduction 3. Description of the comparative analysis between the cases studied and the theoretical matrix 	Bibliographic research (Gil, 2010) to collect secondary data from the literature. Netnography (Kozinets, 2002) and survey (Gil, 2010) for collecting secondary and primary data on the cases studied.
Analysis units	<ul style="list-style-type: none"> • Secondary data from the literature. • Online secondary data from users of the case studies. • Primary data collected through survey. 	Multiple sources of evidence to allow triangulation or convergence at the end of the analysis (Yin, 2001).

ATTRIBUTE	RESEARCH CHARACTERIZATION	JUSTIFICATION
Collection techniques	Systematic literature review	Know the state of the art on the subject (Treinta et al., 2013).
	Netnography	Use of online publicly available information to understand the needs and decisions that influence consumer groups (Kozinets, 2002).
	Survey	Direct interrogation of people about their behavior and perceptions (Gil, 2010).
Collection field	<ul style="list-style-type: none"> • Twitter and Yelp • Submission of online questionnaires 	Identify and understand the needs and decisions that influence groups of online consumers (Kozinets, 2002).
Problem approach and data analysis strategies	<ul style="list-style-type: none"> • Qualitative – Two steps: • Inductive content analysis of literature data 	Identification of the main variables related to the case studies (Elo and Kyngäs, 2008).
	Deductive content analysis of primary and secondary data collected from cases	It benefits from the prior development of theoretical propositions to conduct data collection and analysis (Santos et al., 2018).

Source: Own Authorship (2021).

Next, we also present a consistency matrix (Table 11) that shows the relationship of the research questions and the objectives set to answer each of these questions with the established methodological procedures. Thus, the consistency matrix shows the relationship between the general objective and the specific objectives with the methods, the research stages, and the collection and analysis techniques that allowed the elaboration of this study and the fulfillment of these objectives.

Table 11 – Research consistency matrix

RESEARCH QUESTIONS	RESEARCH OBJECTIVES	METHOD					
Main question	General objective	Primary research method					
What are the main critical success factors in the operation of a carsharing service solution-demand network?	To determine the critical success factors in the operation of a carsharing service solution-demand network.	Multiple case study					
Secondary questions	Specific objectives	Method	Procedures	Data collection techniques	Collection field	Analysis techniques	Results of each step
What are the main factors involved in the operation of shared mobility services?	Discern the main factors involved in the operation of shared mobility services.	Step 1 Case study: Definition of conceptual-theoretical structure	<ul style="list-style-type: none"> - Selection of the analysis corpus - Literature mapping - Propositions outline 	Systematic Literature Review for secondary data collection	Literature	Inductive Content Analysis	Conceptual-theoretical model with the main factors discerned
Who are the main actants and how do they interact in the operation of carsharing services?	Identify the main actants and their interactions in the operation of carsharing services.	Step 1 Case study: Definition of conceptual-theoretical structure	<ul style="list-style-type: none"> - Selection of the analysis corpus - Literature mapping - Propositions outline 	Systematic Literature Review for secondary data collection	Literature	Inductive Content Analysis	Conceptual-theoretical model with the main actants and their identified interactions
What is the relationship between factors and actants with the continuity and interruption of carsharing services?	Correlate factors and actants with cases of continuity and interruption of carsharing services.	Steps 2-5 Case study: 2. Plan the cases 3. Conduct pilot test 4. Collect the data 5. Analyze the data	<ul style="list-style-type: none"> - Case selection - Definition of analysis units - Establishment of protocol - Conducting tests and pre-analysis - Data collection and storage - Comparative description and interpretation 	Netnography for collecting tweets and comments (Secondary data) Survey by questionnaire (Primary data)	Twitter Yelp Questionnaires Cases websites	Deductive Content Analysis	Description of the analysis of the correlation between the cases studied with the conceptual-theoretical model
Answer to the main research question	Meeting the general objective	Step 6 Case study: Generate final report	<ul style="list-style-type: none"> - Identification of theoretical implications - Production of the final narrative 	-	-	-	Final model of critical success factors

Source: Own Authorship (2021).

After describing the methodological framework of this study, the following subsection details the procedures for the operationalization of this research.

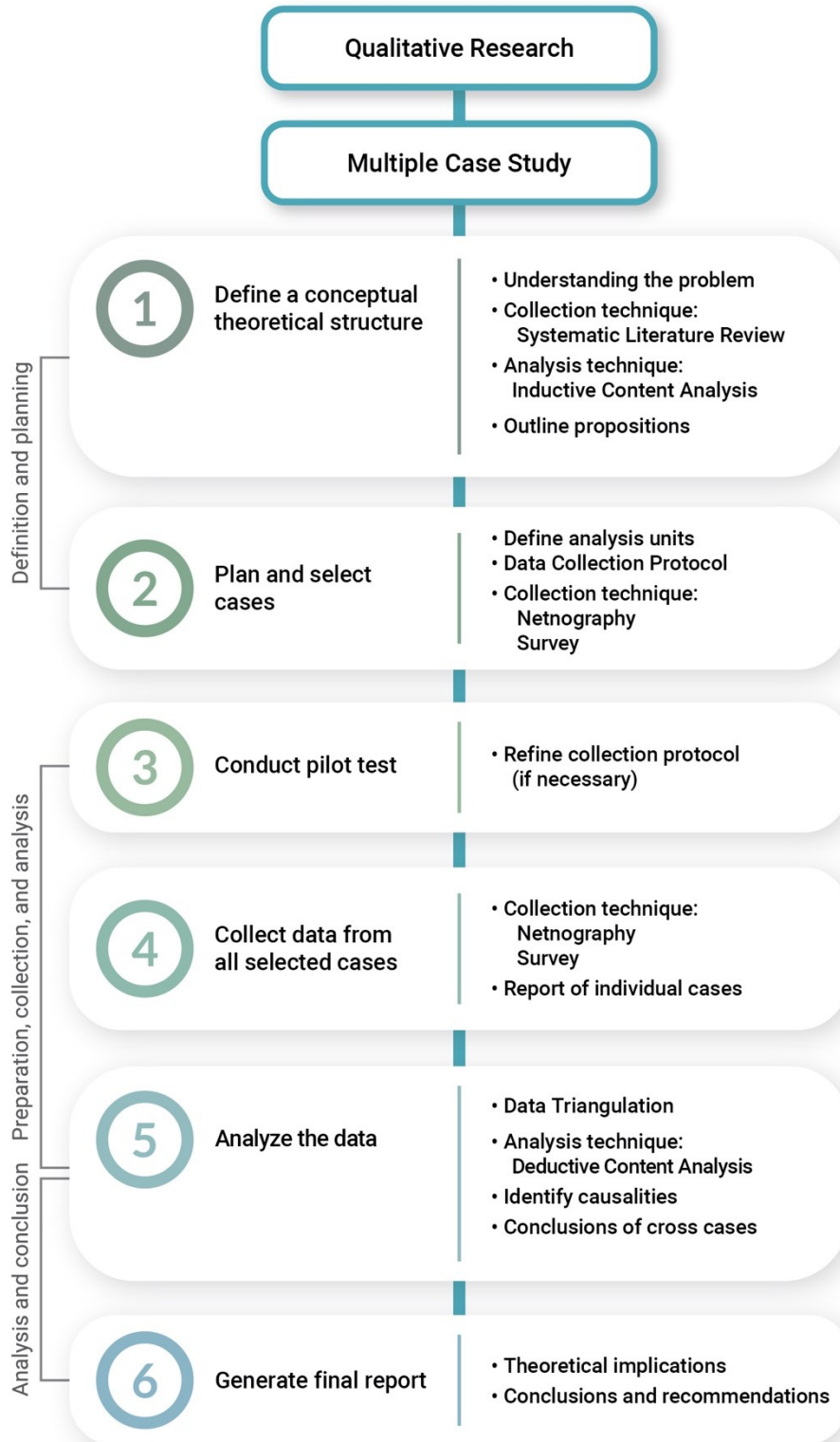
3.2 OPERATIONALIZATION OF THE RESEARCH STEPS

Considering the multiple case study (Yin, 2001) as the primary method of this thesis, the explanation of the operationalization of the research can be made from its six main steps:

- 1) **Conceptual-theoretical structure definition:** It involves understanding the problem, mapping the literature, and outlining propositions. In this thesis, it involved the procedures of a systematic literature review of the Bibliographic Research, with secondary data collection and proposition of the conceptual-theoretical structure through the technique of inductive content analysis. These procedures are detailed in sections 3.3 and 3.4.
- 2) **Planning and selection of cases to be studied:** It involves the selection of analysis units, choice of means of data collection and analysis, development of the research protocol, and definition of means of research control, detailed in section 3.5.
- 3) **Conducting the pilot test:** refinement of the research protocol, detailed in section 3.5.
- 4) **Data collection:** data collection from the selected cases, from previously established sources and collection techniques (section 3.5).
- 5) **Data analysis:** involves data triangulation, identification of causalities and conclusions of cross cases, developed through deductive content analysis (detailed in section 3.6).
- 6) **Production of the final report:** report of the theoretical implications, conclusions, and recommendations, presented in Chapter 4 – PRESENTATION AND ANALYSIS OF RESULTS.

Thus, despite applying different methods combined in some stages of the research, all of them are considered when conducting the primary method of this research, the case study. Figure 10 outlines these six steps.

Figure 10 – Outline of case study method steps



Source: Adapted from Yin (2001) and Santos et al. (2018).

Table 12 shows the detailed operationalization of each of these steps, indicating which procedures, techniques, and instruments were applied, in addition to the results obtained at the end of each research stage.

Table 12 – Operationalization of methodological procedures from the steps of the case study method

Research step	Procedures	Description and details	Step results
1. Define conceptual-theoretical structure	Bibliographic research Systematic literature review based on PRISMA recommendation	<ul style="list-style-type: none"> - Definition of scientific bases and keywords - Base search and scanning - Definition of inclusion and exclusion criteria - Filtering and selection of the bibliographic portfolio - Full reading of references to establish alignment and outline propositions 	Definition of the analysis corpus (theoretical framework) for theoretical discussion and conceptual alignment
	Inductive content analysis	<ul style="list-style-type: none"> - Pre-analysis: organization of the collected reference - Coding and categorization of analysis categories for matrix proposition - Categories internal validation - Conceptual-theoretical model proposition 	Conceptual-theoretical model with the identification of factors and actants of shared mobility services operation
2. Plan the cases	Case studies selection	<ul style="list-style-type: none"> - Definition of the 6 carsharing service companies to be studied 	Definition of the 6 case studies Research protocol
	Definition of the collection field and analysis units	<ul style="list-style-type: none"> - Publications on Twitter (tweets) about the use of carsharing services made by users of the selected companies - Reviews on Yelp website on the use of carsharing services made by users of these selected companies - Definition of analysis units 	
	Creation of protocol, collection instruments, and means of research control	<ul style="list-style-type: none"> - Definition of variables and data collection and analysis strategies - Creation of the collection instrument for online questionnaires 	
3. Conduct pilot test	Familiarization with the collection field	<ul style="list-style-type: none"> - Registration and researcher insertion in the research online field: Twitter and Yelp, with navigation to understand the field 	Definition of search strategies and collection instruments
	Collection and initial pre-analysis	<ul style="list-style-type: none"> - Tests and definition of search strategies for data collection in the field: - Keywords and Temporal Filters - Pilot test of the questionnaires - Data quality verification and adjustments 	
4. Collect the data	Netnographic techniques and non-participant observation	<ul style="list-style-type: none"> - Online data collection and storage in NVivo - Field diary of initial insights 	Total data collected: Online publications by netnography and questionnaire responses
	Survey	<ul style="list-style-type: none"> - Questionnaires submission to the three defined groups of participants 	
5. Analyze the data	1st filtering of data collected by netnography and questionnaires	<ul style="list-style-type: none"> - Collected data validation and filtering based on the criteria established in the protocol, to ensure the reliability of the research 	Analysis description of the correlation between factors and actants with cases of continuity and interruption of shared mobility services
	Deductive content analysis	<ul style="list-style-type: none"> - Triangulation of collected data - Identify causalities - Analysis description by comparing the cases and analyzing them with the conceptual-theoretical model 	
6. Generate the report	Final report production	<ul style="list-style-type: none"> - Theoretical implications - Inferences and conclusions 	Proposition of the final model of critical success factors

Source: Own Authorship (2021).

The operationalization of each of these steps throughout this research will be detailed in the following sections.

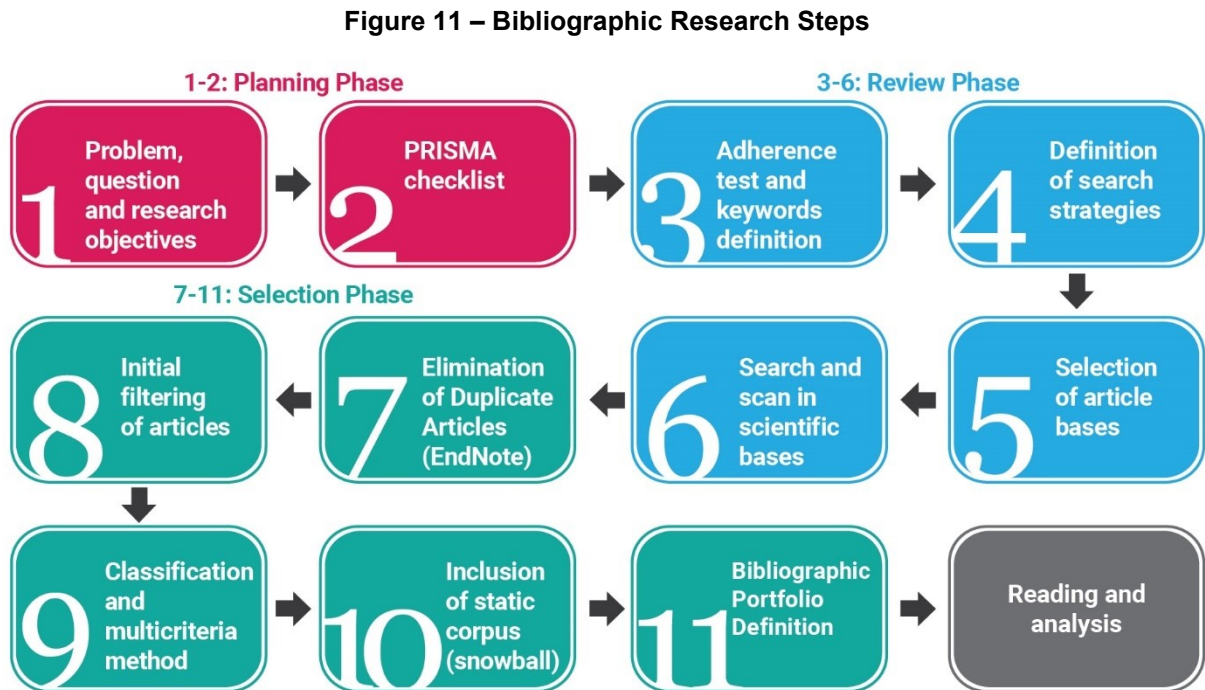
3.3 BIBLIOGRAPHIC RESEARCH

As described at the beginning of this Chapter, the first step of the case study method, defining the conceptual-theoretical structure, involves understanding the problem, mapping the literature, and outlining propositions and criteria for interpreting the findings. Therefore, an initial secondary data collection from the literature was carried out, elaborated through bibliographical research. The results of this stage contributed both to the definition of this thesis' theoretical framework, deepened in Chapter 2 – Literature Review, and to provide the secondary data analyzed in the inductive content analysis stage, thus enabling the construction of the conceptual-theoretical model.

Bibliographical research is suggested by Gil (2010) for its development based on materials already published, which allows broader coverage of the discoveries related to the research topic. In this study, the bibliographical research stage is related to the general objective and all the specific objectives, as it serves to bring relevant theoretical contributions in the survey of the key concepts addressed. Furthermore, through bibliographical research, it is also possible to know the state of the art and recent publications on the subject and contribute to the search for other works already carried out that present relationships between concepts and research trends (Treinta et al., 2013).

To carry out the bibliographical research, a systematic literature review method was applied in this study, supported by the PRISMA recommendation (Moher et al., 2015; Taveira et al., 2018). The systematic literature review is a scientific method to develop research and analyze articles from a particular study field, indicated by the concern with rigor, for being methodical, transparent, and allowing traceability (Ramos, Faria, and Faria, 2014). In addition, the multicriteria method (Treinta et al., 2013) and snowballing reading procedure (WOHLIN, 2014) were applied to select the final analysis corpus.

In this research, the bibliographical research, from its initial planning to the final selection of the analysis corpus, can be divided into some steps that allow its development. Figure 11 demonstrates these main procedures separated into three execution phases.



Source: Own Authorship (2021).

The following subsections detail the steps to develop the systematic literature review.

3.3.1 Systematic Literature Review

The systematic literature review in this research was separated into three main phases: (1) Planning; (2) Review, and (3) Selection. Table 13 presents the procedures applied in each of the phases.

Table 13 – Systematic literature review phases and procedures

PHASES	1. PLANNING	2. REVIEW	3. SELECTION
PROCEDURES	Definition of research objectives and filling of the PRISMA recommendation checklist	Literature review Keywords adherence tests, definition of search and scanning strategies in scientific bases	Filtering, elimination, and classification of articles following the multi-criteria method and inclusion using the snowballing method

Source: Own Authorship (2021).

The procedures adopted in each phase are detailed next.

3.3.1.1 Planning and PRISMA recommendation

The systematic review planning stage consisted of the initial identification of the problem and the research question, and the definition of the objectives that guide the research. The delineation of these elements, already presented in the introductory chapter of this thesis, is essential to proceed with the other steps.

Then, the PRISMA recommendation was applied to contribute to elaborating a consistent protocol for the bibliographic research. Entitled Preferred Reporting Items for Systematic Reviews and Meta-Analyses – PRISMA and proposed by Moher et al. (2015) and Taveira et al. (2018), consists of a 27 items checklist that should be defined before carrying out the research. Thus, it is a detailed record of a protocol for relevant systematic reviews. Despite being more applied to research with health-related results, it can also be applied to studies in applied social sciences. In this research, PRISMA served as a recommendation for consistent strategies for searching, filtering, and including articles for the bibliographic portfolio.

Appendix B presents the PRISMA recommendation checklist completed according to the criteria defined for this systematic literature review. The PRISMA recommendation was used mainly to determine elements such as temporal filter, types of sources to be collected and selected, scientific bases, search strategies, and definition of eligibility criteria for reference inclusion and exclusion. From this definition, it was possible to conduct the searches through literature review.

3.3.1.2 Literature review

The research to identify the preliminary theoretical framework was carried out from a literature review. It consisted of the following steps: adherence and keyword combination tests, the definition of search strategies, selection of scientific bases, and, finally, searching and scanning the bases.

For the adherence and keyword combination tests, an initial list of words was proposed, based on the definition of the theme, research topic, problem, and objectives. Then, these keywords were searched separately on the Google Scholar website to quantitatively verify the term's relevance, measuring the return of each keyword when searched without combining it with others. The purpose of this test is to eliminate keywords that do not adhere to the theme or that represent little to the study area (Ruthes and Silva, 2015).

In addition to searching for separated terms, experimental searches were also carried out with the combination of these words to verify the best combination for the selected keywords. For this, the decision criteria were (i) the number of articles returned, (ii) the relevance, adherence, and alignment of articles that returned in the searches concerning the research objective, through the unstructured reading of titles and abstracts (Lacerda, Ensslin, and Ensslin, 2012). Finally, ten keywords were defined, separated into three groups related to the themes, as presented in Table 14.

Table 14 – Keywords defined for review in scientific bases

GROUP 1 SERVICE DESIGN	GROUP 2 SHARING ECONOMY	GROUP 3 SOLUTION-DEMAND NETWORKS
<i>Service design</i> <i>Service quality</i> <i>Service evaluation</i> <i>Service failure</i> <i>Service success</i> <i>Service operation</i> <i>User experience</i> <i>eWoM</i> <i>Co-creation</i>	<i>Shared mobility services</i> <i>Shared mobility</i> <i>Sharing economy</i>	<i>Actor-Network Theory</i> <i>Network</i>

Source: Own Authorship (2021).

The adherence tests of keywords and their combinations also allowed defining the search strategies (strings), the combination of words using Boolean operators, which was also determined in the PRISMA checklist. Thus, of the 14 established terms, 36 combinations were defined as search strategies.

The searches were carried out with the combination of 14 defined terms. Simple searches with isolated terms were not conducted as the results were too broad and outside the scope of the search. The exception was the term “shared mobility services”, which is already a refinement and more specific term of the expression “shared mobility.”

Before starting the searches, the platforms or scientific bases were defined. The definition of these bases also took place through tests to verify the results of the bases, thus selecting the most adherent. Hence, four international databases were selected: Science Direct, Scopus, Web of Science, and ProQuest. These were chosen for their relevance to the research topic. Nationally, the Brazilian Institute of Information in Science and Technology (IBICT) – Oasisbr was selected, as it is a portal in Portuguese for scientific publications in open access, which includes articles, thesis, and dissertations.

The scanning of the bases took place during July and August 2020, defining as a temporal filter the publications within the last five years (2015-2020), as determined in the PRISMA recommendation checklist. Searches were made using terms in English due to the selection of international databases that allowed a greater range of references on the topics, including the national portal. The result of these initial searches raised a total of 1,950 references.

Table 15 presents the results of this initial stage of collections. First, keyword groups are separated according to theme and relationship to all 36 combinations. Next, data tabulation was performed according to each combination, separating the search results in each of the selected databases, in addition to showing the total number per combination.

Table 15 – Scientific bases search results by keyword combination

KEYWORDS GROUPS				SCIENTIFIC BASES							
	G1		G2	G3	ProQuest	Science Direct	Scopus	WoS	Oasisbr	TOTAL	
1			Shared mobility services		141	108	40	23	26	338	
2	Service design	AND	Shared mobility		7	23	3	1	6	40	
3			Sharing economy		26	56	18	6	12	118	
4	Service quality	AND	Shared mobility		28	59	5	1	5	98	
5			Sharing economy		60	187	27	25	11	310	
6	Service evaluation	AND	Shared mobility		2	3	1	1	2	9	
7			Sharing economy		5	13	1	1	7	27	
8	Service failure	AND	Shared mobility		1	3	0	0	0	4	
9			Sharing economy		4	36	2	0	0	42	
10	Service success	AND	Shared mobility		0	1	0	0	0	1	
11			Sharing economy		2	2	0	0	0	4	
12	Service operation	AND	Shared mobility		2	0	0	0	0	2	
13			Sharing economy		6	0	6	0	0	12	
14	User experience	AND	Shared mobility		1	50	2	1	0	54	
15			Sharing economy		12	105	28	19	2	166	
16	eWoM	AND	Shared mobility		0	2	0	0	0	2	
17			Sharing economy		7	24	6	9	0	46	
18	Co-creation	AND	Shared mobility		4	22	1	2	0	29	
19			Sharing economy		114	173	46	76	5	414	
20			Shared mobility	AND	Actor-Network Theory	1	2	0	0	0	3
21			Sharing economy		Actor-Network Theory	4	9	0	1	0	14
22	Service design				Actor-Network Theory	5	16	1	1	4	27
23	Service quality			AND	Actor-Network Theory	25	16	1	0	1	43
24	Service evaluation				Actor-Network Theory	3	1	0	0	1	5

KEYWORDS GROUPS						SCIENTIFIC BASES					
	G1		G2		G3	ProQuest	Science Direct	Scopus	WoS	Oasisbr	TOTAL
25	Service design					3	21	1	0	3	28
26	Service quality					23	56	1	1	4	85
27	Service evaluation					2	2	1	1	0	6
28	Service failure					1	0	0	0	0	1
29	Service success	AND	Shared mobility	AND	Network	0	0	0	0	0	0
30	Service operation					2	0	0	0	0	2
31	User experience					9	0	0	0	0	9
32	eWoM					0	0	0	0	0	0
33	Co-creation					11	0	0	0	0	11
34	Service design					0	0	0	0	0	0
35	Service quality	AND	Shared mobility	AND	Actor-Network Theory	0	0	0	0	0	0
36	Service evaluation					0	0	0	0	0	0
TOTAL						511	990	191	169	89	1.950

Source: Own Authorship (2021).

It is possible to observe, from the data indicated in Table 15, that there are publications that relate the themes of Service Design with the sharing economy and shared mobility services. However, the number of publications is smaller concerning network elements, particularly regarding the Actor-Network Theory. In addition, few results were found related to the problem and focus of this study, as in the relationship of the terms on operation, success, and failure of services and their combination with the terms of sharing economy and shared mobility. We understand, therefore, that the theory perspective can bring contributions to understand better how aspects of the relationship between actors work on issues related to sharing economy and shared mobility and to Service Design.

We also point out that although there are publications that relate two of the key themes, the amount is much smaller or non-existent in the case of publications that present the relationship between the three key themes. Therefore, we highlight the identification of a gap that allows us to study the relationship between these three themes and the contribution of the originality of the thesis in the joint approach of these three concepts.

Next, the following steps filtered and classified the initial references found to select the final article portfolio.

3.3.1.3 Selection of the final corpus by multicriteria and snowballing methods

After scanning the databases, it was necessary to carry out several filtering processes, as pointed out by the systematic review, to select only the most relevant articles aligned with the research objective. Thus, the following procedures were performed: duplicated reference elimination, screening by dynamic reading, classification by the multicriteria method, and inclusions by the snowballing technique.

For reference management, the 1,950 results obtained were imported into EndNote X7 software. First, duplicate references were eliminated using the software's resources to find duplicates. Duplications occur because the same article can appear on different bases or in more than one combination of terms. Then, a new filter was applied manually, observing duplicate references that the software did

not register. This happens due to some information filled differently in the imported articles, such as a variation in the spelling of the authors' names, in which some articles register the full name, and others only the initials. Therefore, of the 1,950 initial references obtained, there were 604 duplicates, leaving 1,346 after their exclusion.

The next step was filtering or screening the 1,346 articles regarding adherence and relevance to the research topic and objectives. For this, a dynamic reading of the main elements was carried out: Title, Abstract, Keywords, and Results. Also, the information filled in the PRISMA recommendation checklist served as a basis for the decision, mainly considering the alignment with the research objective.

Some of the main reasons for this elimination were:

- a) References that were just indexes, news, or summaries.
- b) References related to health area: the term “mobility” can also be used for studies regarding people with disabilities, and Service Design has many publications in the health field, enabling this overlapping of themes.
- c) Keywords that appeared in the title or abstract but were not the focus of the article (not aligned with the research objectives).
- d) Terms used in another sense (E.g., mobility).
- e) No access to abstract information or to the full article.

From this first reading and filtering, 1,001 articles without alignment were discarded, leaving 345 records assessed for eligibility. The remaining 345 references were then ordered according to scientific criteria to represent a preferential basis without bias in the choice. Thus, a multicriteria support method was adopted (Treinta et al., 2013).

In the multicriteria method, the use of multiple indicators helps to make the analysis more robust and minimizes the impact of the indicators' limitations. Thus, it allows looking at publications by different metrics and perspectives since using each metric alone has advantages and disadvantages. The multicriteria method suggests evaluating the articles' relevance concerning four main axes: paper, authors, journal, and theme. For this, the year of publication, the number of citations, the journal's impact factor, and the grade given to the article regarding its alignment with the research are analyzed. Alignment with the study is an assessment made by the researcher and can be considered the most relevant criterion of those examined.

Even if the article has many citations, with relevant authors in the field and a well-evaluated journal, if the article is not aligned with what the researcher has outlined as the theme of his work, it is not relevant to the study (Treinta et al., 2013).

Therefore, the 345 references were first tabulated in a Microsoft Excel spreadsheet to assess each of these aspects. Then, the main elements of each article were extracted, as follows: authors' names, type of publication (journal article, conference, book, thesis), title of the journal or conference, main concepts dealt by the article, objective and results of the paper, alignment criteria defined by the researcher; impact factor (Scientific Journal Rankings, 2018), number of citations and year of publication.

Then, the articles were classified. Following the multi-criteria method, adherence scales were defined considering the researcher's criteria, aligned with the research objectives (Ruthes and Silva, 2015; Treinta et al., 2013), and registered in the PRISMA checklist. Thus, on a scale ranging from 0 to 3, the articles were classified as:

- a) Strong adherence (weight 3): articles classified as having strong adherence were incorporated into the analysis portfolio because they contained the relationship of at least two or three of the central concepts (keywords).
- b) Medium adherence (weight 2): articles classified as having medium adherence were related to the key themes, but because they dealt predominantly with only one of the main themes, they underwent second filtering and tiebreaking criteria considering the items: number of citations, impact factor and year of publication.
- c) Weak adherence (weight 1): Articles classified with weak adherence presented only one of the concepts, mainly related to the sharing economy, and were considered more relevant by the methodology used. Thus, they were set aside for a methodological review but were not included in the final analysis portfolio.
- d) No adherence (weight 0): these were eliminated because they were articles that, despite being related to the topic, did not address the focus and delimitation of this research, such as articles on Circular Economy or case studies aimed at the accommodation sector (Airbnb), or still related to mobility, but more concerned with measuring issues related to traffic and

pollution. In addition, master's dissertations and undergraduate papers were also discarded.

Table 16 presents this first classification of articles according to their adherence. Thus, articles with no adherence (0) were discarded; articles with weak adherence (1) were separated for a methodological review, articles with strong adherence (3) were selected to form part of the portfolio, and articles with medium adherence (2) were separated to perform another filtering and selection.

Table 16 – Article distribution by adherence criterion

Research adherence	Number of articles	Representativeness (%)
Strong (3)	84	24,3%
Medium (2)	39	11,3%
Weak (1)	11	3,2%
No adherence (0)	211	61,2%
TOTAL	345	100,0%

Source: Own Authorship (2021).

For references classified as having medium adherence (weight 2), tiebreaking criteria were used to verify their relevance for inclusion in the analysis corpus. Most of the articles dealt with shared mobility concepts or specific case studies of some models of shared mobility. Therefore, the following items were considered: number of citations, impact factor, and year of publication. The classification of these elements in a spreadsheet was done by applying the InOrdinatio formula (Pagani et al., 2015), classifying the references considering the three elements together (number of citations, impact factor, and year of publication), instead of looking at each item separately. Thus, references with an InOrdinatio index greater than 11 were included in the final portfolio, as they had at least one citation, even though they were recent publications.

Thus, with the support of the multi-criteria method, it was possible first to include the references considered most relevant due to their alignment with the research, but without disregarding scientific relevance issues such as the impact factor and number of citations. Thus, of the 39 references classified as having medium adherence, 13 were eliminated, and 26 were included in the final portfolio.

Appendix C presents an example of this tabulation, with some of the references sorted according to these criteria.

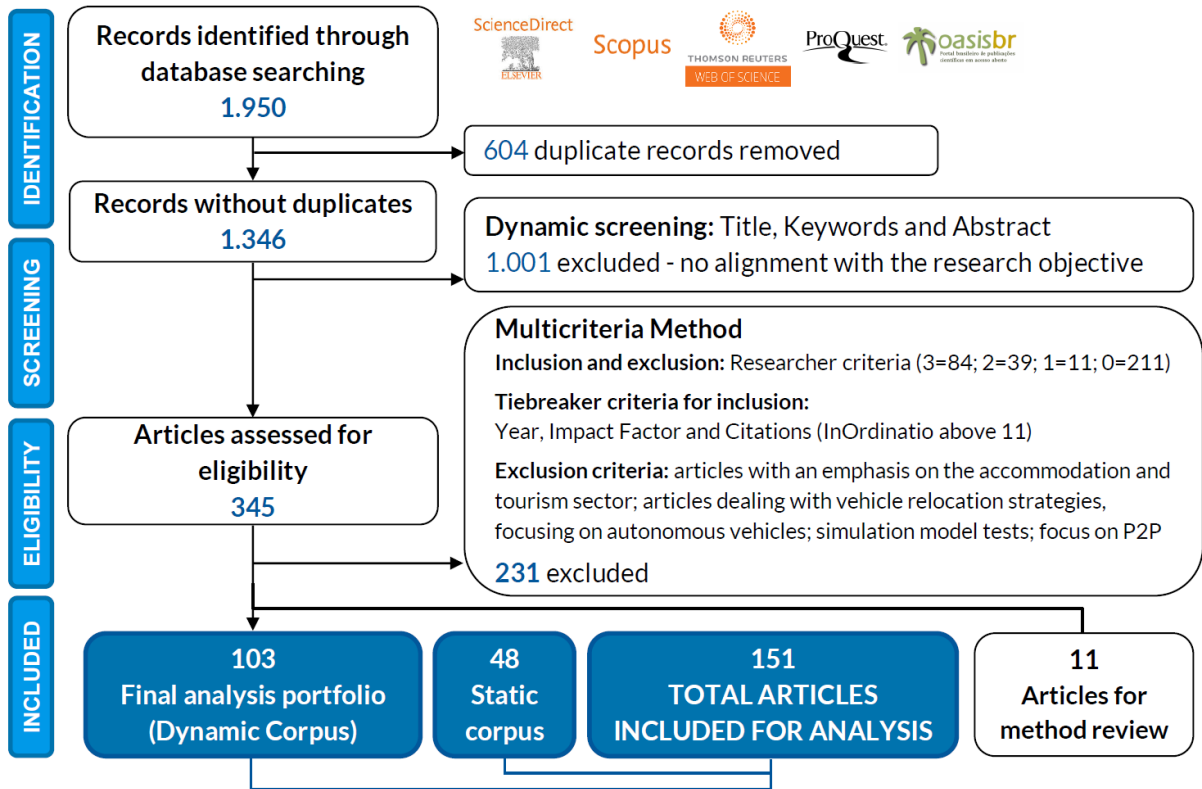
Finally, 114 articles remained, of which 11 were considered only for methodological review, resulting in a dynamic corpus (current literature and state of the art) of 103 references.

In addition to being formed by the dynamic corpus (state of the art), the final bibliographic portfolio for theoretical foundation and analysis of this thesis is also formed by the static corpus. It consists of seminal works by base authors, which did not appear in the search due to the temporal filter, but were cited in almost all articles (Wohlin, 2014). Thus, to include recent publications and the base literature in the final analysis portfolio, the snowball reading method was used, which allows the identification of a seminal and highly cited publication on the subject (Wohlin, 2014). This procedure was carried out throughout the readings in full of the 103 selected documents, highlighting the most relevant references, especially those most cited by the dynamic corpus, in addition to others included as relevant, to avoid citation citations, seeking the original source. Thus, 48 more references were included as static corpus, thus resulting in a final analysis corpus of 151 articles, of which about 25% (37 references) consist in publications older than five years.

Therefore, the final corpus consisted of 151 references for analysis, of which 124 are journal articles, 18 are books or book chapters, 5 are doctoral thesis, and 4 are articles published in conferences.

Figure 12 shows a flowchart from the PRISMA recommendation that summarizes the entire process described in this systematic literature review, from identifying the databases to the final selection of the corpus, pointing out the eligibility criteria for inclusion and exclusion of references until reaching the final portfolio.

Figure 12 – PRISMA flowchart



Source: Own Authorship (2021), adapted from Moher et al. (2015).

The conduction of all these systematic literature review steps allowed the definition of the bibliographic portfolio. Hence, it contributed to the theoretical framework of this thesis, presented in Chapter 2, and formed the secondary database for the proposition of the conceptual-theoretical model through inductive content analysis.

3.4 DEFINITION OF THE CONCEPTUAL-THEORETICAL STRUCTURE

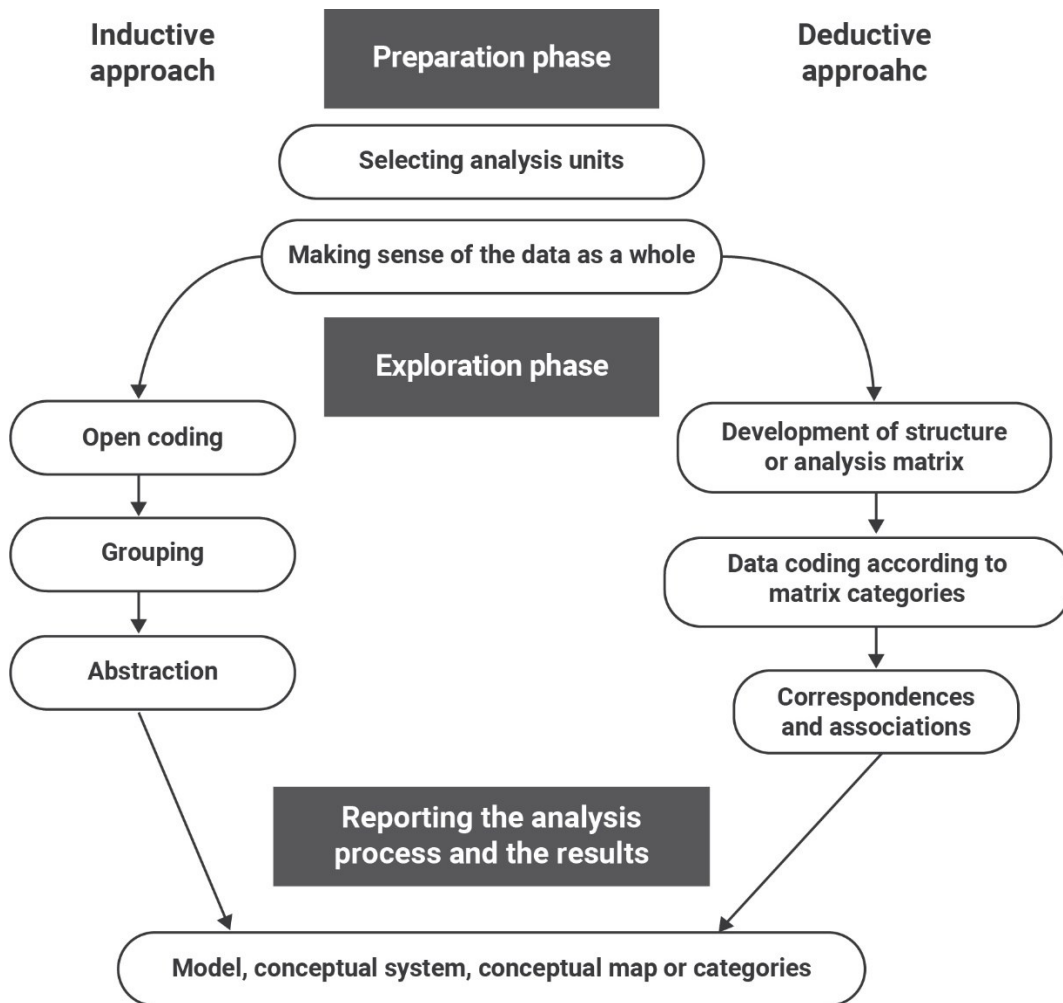
To conclude the first stage of the case study method, the definition of the conceptual-theoretical structure was carried out through the inductive content analysis of secondary data collected in the systematic literature review.

3.4.1 Inductive Content Analysis

In this research, content analysis as an analysis technique was adopted at two different stages. (1) First, for the conceptual-theoretical model proposition, using secondary data, being part of the first stage of the case study method, related to two first specific objectives of the thesis. (2) Second, to analyze the primary and secondary data collected on the cases studied by comparing these data with the proposed theoretical model, regarding the last specific objective of this research.

These two analysis stages have different purposes. Therefore, two approaches to content analysis were applied: inductive and deductive (Figure 13).

Figure 13 – Inductive and deductive approach to qualitative content analysis



Source: adapted from Elo and Kyngäs (2008).

Inductive content analysis, also known as conventional, humanistic, or naturalistic, involves open coding processes, creating categories and abstraction, resulting in a model, concept map, or analytical categories (Elo and Kyngäs, 2008). On the other hand, the deductive, directed, or positivist content analysis approach starts with developing a categorization matrix or analysis matrix, and the data are coded from these established categories (Elo and Kyngäs, 2008).

Regardless of the approach, content analysis is a scientific tool and potentially one of the most relevant research techniques in the social sciences. As a technique, it involves specialized procedures. It provides new ideas and increases the researcher's understanding of specific phenomena or informs practical actions (KRIPPENDORFF, 2004). The content analysis consists of an empirical method, and there is no strict procedure to put it into practice, but some basic rules should be followed, which must be: homogeneous; exhaustive; exclusive and objective; appropriate or relevant (Bardin, 2011).

Quantification is not a defining criterion for content analysis, as a text is essentially qualitative, and content analysis can result in verbal responses to a research question. The word count or frequency of some aspects in the text is only convenient, but it is not a requirement to obtain valid answers to a research question (KRIPPENDORFF, 2004). For Krippendorff (2004), quantitative and qualitative approaches are both relevant since the first is concerned with the explicitness and objectivity of scientific data processing, and the second with the adequacy of the procedures used concerning a chosen context.

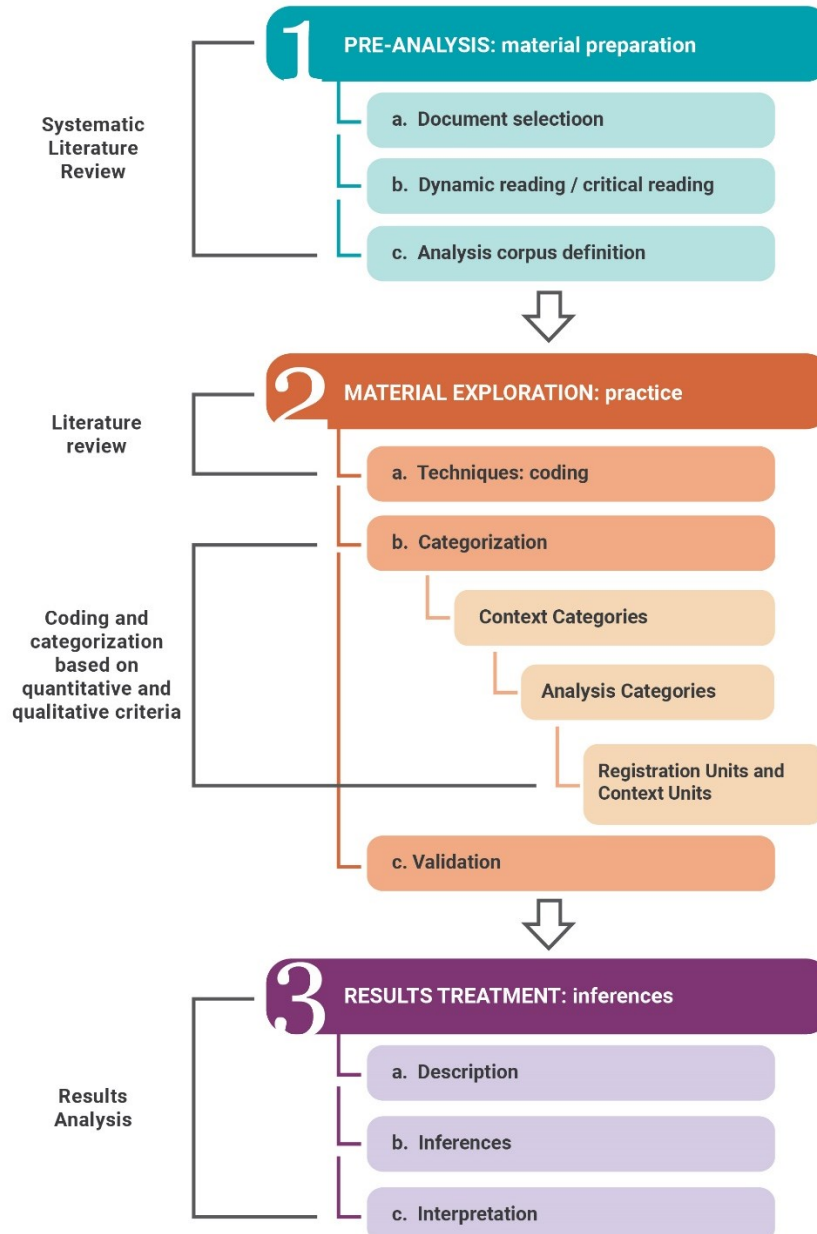
Therefore, content analysis is predominantly qualitative in terms of results but uses quantitative and qualitative procedures. Quantitative procedures essentially consider the frequency of certain elements in the content, while in the qualitative approach, the presence or absence of a characteristic or set of them in a message fragment is observed. Despite being quite descriptive, content analysis has the objective and function of inference through interpretive attitudes based on the evidence and indicators raised, supported by a technical validation framework (Bardin, 2011).

The following subsections detail the procedures for conducting the inductive content analysis. The procedures adopted for conducting content analysis with a deductive approach are detailed in section 3.6 of this chapter.

3.4.2 Inductive Content Analysis Phases

Following the procedures proposed by Bardin (2011), Elo and Kyngäs (2008), Erlingsson and Brysiewicz (2017), and Krippendorff (2004), the inductive content analysis was carried out in three main phases: 1. Pre-analysis and material selection (preparation); 2. Exploitation of material by coding and categorization; 3. Validation of categories and conceptual model proposition. Figure 14 outlines the synthesis of the procedures involved in each of the phases.

Figure 14 – Content Analysis Phases



Source: Own Authorship (2021).

Next, we detail the procedures developed in each of the inductive content analysis phases.

3.4.3 Phase of pre-analysis and material selection (preparation)

The first phase of pre-analysis consists of formulating the research question and organizing the material to be analyzed. It involves the survey of documents, performing dynamic and critical reading to select materials, and establishing the analysis corpus (Erlingsson and Brysiewicz, 2017). Bardin (2011) points out some rules for this critical material selection, which considers exhaustiveness, representativeness, homogeneity, and relevance.

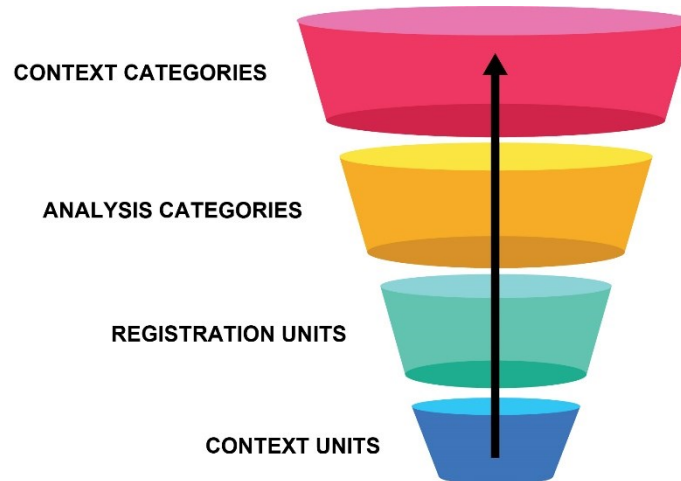
In this research, this first step was conducted during the systematic literature review, detailed in the previous subsection (3.3 BIBLIOGRAPHIC RESEARCH). Thus, it consisted in the search and collection of documents in scientific bases, screening through dynamic and critical reading to assist in the selection, until reaching the final corpus, resulting in a sample of secondary data (151 documents) for the analysis of its content in the next stage of material exploration by coding and categorization procedures.

3.4.4 Phase of material exploitation by coding and categorization

In the second phase, with the analysis portfolio collected and selected, we worked with the practical exploration of the documents. We applied open coding techniques by transforming the content into units of meaning that allowed further categorization. Coding is the transcription, recording, categorization, or interpretation of certain units of analysis in terms of a data language so that they can be compared and analyzed (KRIPPENDORFF, 2004). It also consists of transforming the raw data of the text based on precise rules. Whether by clipping, aggregation, or enumeration, “it allows reaching a representation of the content or its expression; susceptible of clarifying the analyst of the characteristics of the text” (Bardin, 2011, p. 133).

After coding, categorization strategies were applied, carried out in the process of abstraction of the content, which goes from the most minor and particular units to the largest and most comprehensive (Figure 15).

Figure 15 – Coding and categorization process flow



Source: Own Authorship (2021).

According to Bardin (2011), categorization can be subdivided into 4 groups:

- a) **Context categories:** they cover the content as a whole and are the broadest categories. They can be defined by bibliographic research and are directly related to the research objectives.
- b) **Analysis categories:** subdivision of the context categories into smaller parts that will allow the analysis.
- c) **Registration units:** these are the words or theme words that explain the analysis category and can be defined by quantitative criteria (frequency and recurrence).
- d) **Context units:** phrase, excerpt, or fragment that allows explaining the registration unit.

The coding and categorization process, therefore, can be understood through the development of four steps:

- i) **Open and manual coding:** involves coding all elements considered relevant and related to the research objectives. In this step, the context units are established, consisting of the minor units within the text corresponding to the excerpt describing or representing a registration unit.

- ii) **Auto coding and identification of recurring terms:** in parallel with open and manual coding, some procedures can be adopted to verify the most frequent terms in the content, contributing to defining registration and context units.
- iii) **Grouping and categorization:** Once the registration and context units are identified, they go through a process of grouping into larger categories through categorization, classification, and abstraction. These groupings are made by semantic proximity and similarity, considering that the terminal categories come from the progressive regrouping of categories with a weaker generality and that a good set of categories must have the qualities: mutual exclusion, homogeneity, relevance, objectivity, fidelity, and productivity (Bardin, 2011). At last, these categories are named from the set of registration units they contain, consisting of the analysis categories.
- iv) **Definition of categories and general theme:** from the groupings of similar categories, it is possible to identify the general theme addressed by the categories.

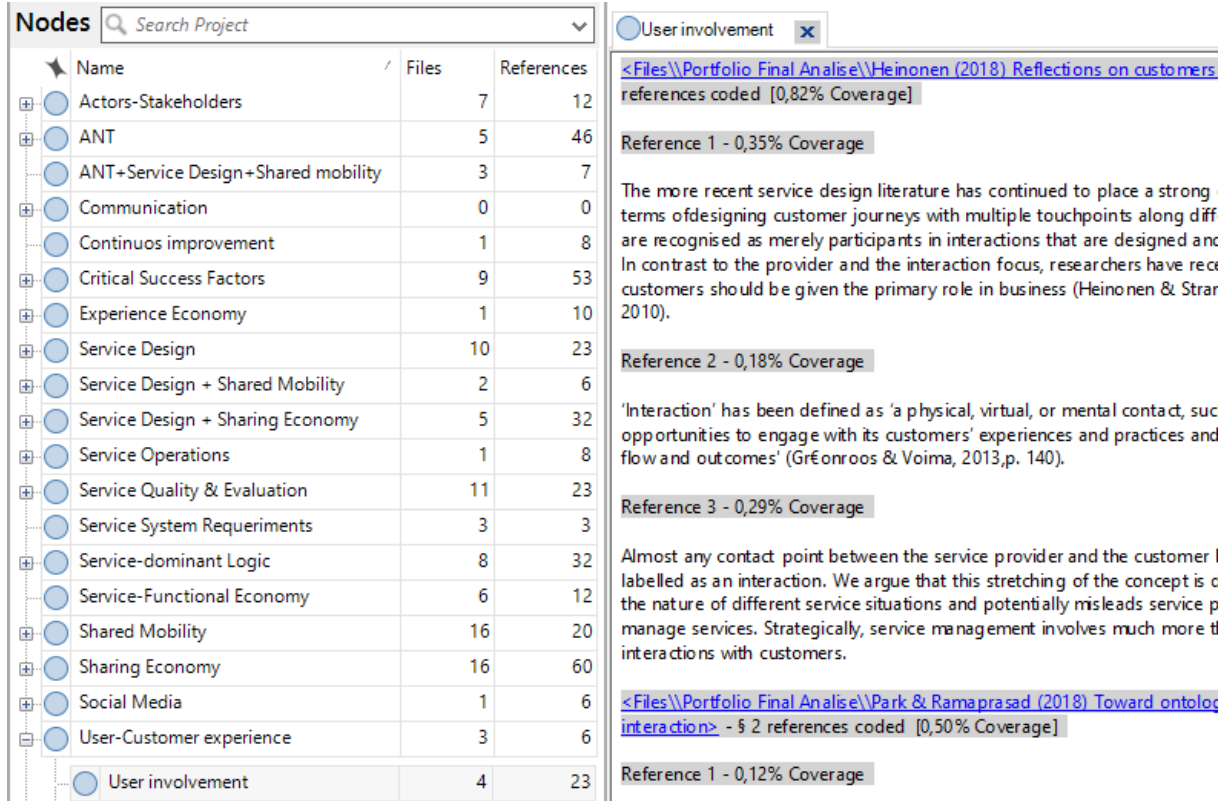
Therefore, in this research, the exploration of the analysis portfolio using coding and categorization procedures was done by dividing and transforming the text into meaning units, which condense important content information into smaller parts and can be grouped into categories and themes. Thus, it starts with the text as a whole, first identifying the minor parts, which were then grouped by similarity and affinity, until forming the most comprehensive categories. The following subsections detail the process of these four steps.

3.4.4.1 Open and manual coding

At first, the content was coded manually by reading in full all 151 documents. This procedure was performed with NVivo 12 Plus, a software aimed at qualitative data analysis (Ramos, Faria, and Faria, 2014). The software has a feature to create “nodes” or “codes,” allowing to select text snippets and assign them to specific nodes. Figure 16 shows the NVivo interface with some of the nodes created in this

step, indicating the number of documents analyzed and the references marked for each node.

Figure 16 – NVivo interface with nodes created by open and manual coding



Source: Own Authorship, using NVivo software (2021).

All elements considered relevant and related to the specific objectives a) and b) of the research were initially coded during this open coding process: a) discern the factors and b) identify the actants. Thus, the context units were identified (the smallest units within the text, corresponding to the excerpt that describes or represents a code) and coded in registration units. This procedure was performed during the literature review by fully exploring the materials, encoding the text elements throughout the reading. Tables 7, 8, and 9 presented in subsection 2.5 CONCEPTUAL ALIGNMENT are the synthesis of this open coding process, as they present an initial survey of the main concepts identified.

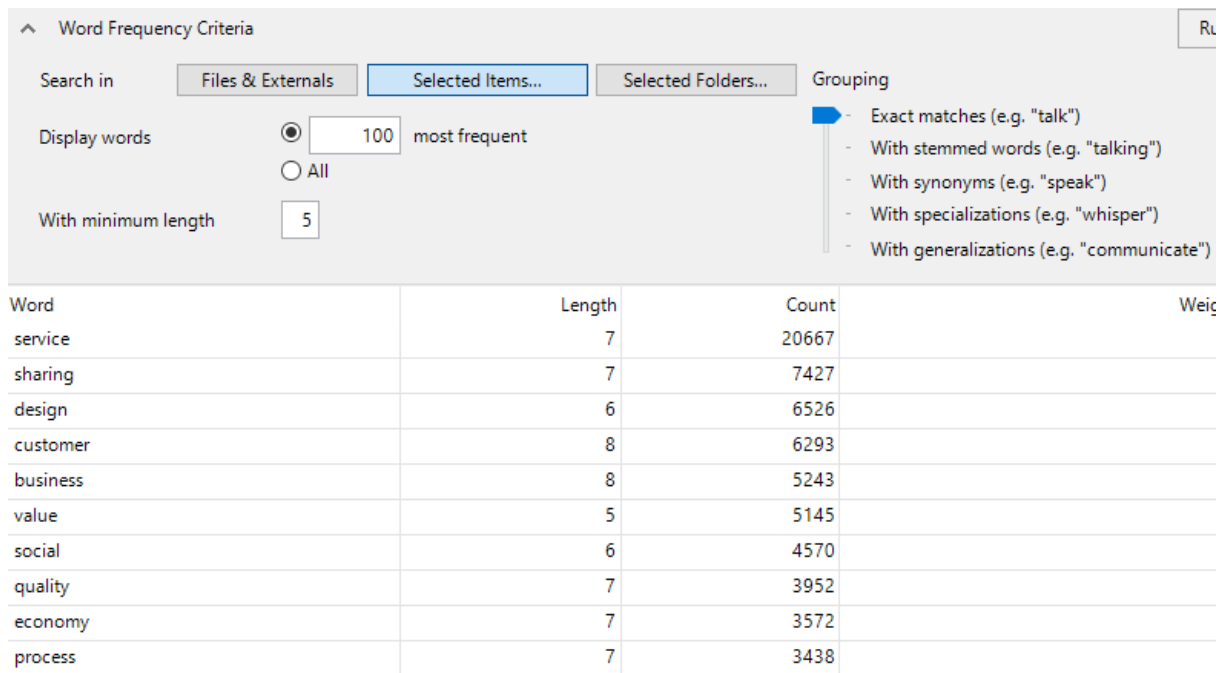
The open and manual coding is qualitative, paying attention to the content and meaning of the coded excerpts. In total, 153 nodes were created manually (20 primary nodes and 133 subcategories). The list with all these codes was then exported to a Microsoft Excel spreadsheet. Furthermore, a quantitative survey of the most recurrent terms was carried out, contributing to this initial survey of codes.

3.4.4.2 Identification of recurring terms and auto coding

After open coding, the most frequent and recurrent terms in the content were also identified by applying two functions of NVivo software: word frequency query and auto coding.

The word counting process consisted of identifying the 100 most frequent words in all the analyzed content (151 documents), using the NVivo “Word Frequency Query” function (Figure 17). As filters, words were limited to a minimum length of 5 characters, with the option to match the exact term. In addition, some words were added to the list of stop words in order not to be considered in this count, as they were terms unrelated to the research interest, such as conjunctions, adverbs, pronouns, and journal names. The resulting terms were in English since only 3 of the 151 documents were in Portuguese.

Figure 17 – NVivo interface with word query feature



Source: Own Authorship, using NVivo software (2021).

After identifying the 100 most frequent words, the results were exported to an Excel spreadsheet. From this list, a word cloud was also created, which shows the frequency of the term according to its size in the cloud (Figure 18).

Figure 19 – Auto coded nodes in NVivo software

Autocoded Themes					
	Name	Files	References		Created On
+	business		114	955	27/07/2020 15:27
+	customer		107	1744	27/07/2020 15:27
+	design		95	1332	27/07/2020 15:27
+	model		126	1153	27/07/2020 15:27
+	process		110	1257	27/07/2020 15:27
+	research		123	1091	27/07/2020 15:27
+	service		138	4781	27/07/2020 15:27
+	sharing		126	1106	27/07/2020 15:27
+	system		132	1114	27/07/2020 15:27
+	use		131	1077	27/07/2020 15:27

Source: Own Authorship, using NVivo software (2021).

After an initial filtering process, to keep only the themes related to the research objectives (factors and actants), 491 codes remained (9 main themes and 482 sub-themes). The remaining automatically generated codes were also exported in a list to Excel. The results of the auto coding allowed for subsequent comparison with the codes raised manually, identifying similarities and differences in the identified units, in addition to helping to validate the open coding nodes so that codes present in both manual and automatic coding were reaffirmed. After this initial survey of registration codes or units, done both manually and automatically, the next step was grouping and categorization.

3.4.4.3 Grouping and categorization of units into categories

At this stage, the units were grouped, classified, and renamed, according to their similarity and meaning, in an abstraction process to identify their respective categories of analysis. The grouping started first considering the units coming from the three procedures previously applied: manual coding, most frequent words, and automatic coding, which were exported from NVivo in lists with their quantification to Microsoft Excel spreadsheets.

First, we refined the codes raised in open and manual coding. The most recurrent terms were sorted. The number of nodes was reduced by grouping them, considering the repetition, similarity, and semantic proximity of terms representing

the same idea, and relating them to the research objectives. The same grouping process was also applied to the automatically generated codes and the 100 most frequent words. Repeated nodes were combined, and associations and equivalences of meaning grouped similar terms.

As already mentioned, the list with the 100 most frequent words presents a count of isolated terms. Therefore, the result of the frequent words served more to confirm the main themes of the research and define the context categories, which were: 1. Design of the shared mobility services and 2. Sharing economy model. This list of frequent words did not contribute to the construction process of the categories themselves. Thus, we decided to use the lists of nodes coded manually and automatically because they present the compound terms and sub-themes most related to the objectives.

After this refinement, we created another Excel spreadsheet with two tabs: (1) auto-coded nodes and (2) manually created nodes. The nodes were then separated into two groups in each spreadsheet, considering the specific objectives: factors and actants. Thus, each code was allocated into one of these groups, as shown in Table 17.

Table 17 – Example of initial node categorization

AUTOCODED NODES		MANUALLY CREATED NODES	
FACTORS	ACTANTS	FACTORS	ACTANTS
Business	Customer	Business Continuity	Actors-Stakeholders
Service quality	Carsharing users	Business Model	(Internet) Service Platform
Customer experience	Frequent users	B2B / B2C / P2P	Companies-Institutions-Organization
Customer loyalty	Active users	Electronic Word-of-Mouth (eWOM)	Ecosystem (Service Infrastructure)
Value creation process	Business networks	Critical Success Factors (in Services)	Energy companies
Customer services	Current users	Appearance (Interface and Vehicles)	Government-Public Authorities-Cities
User satisfaction	Carshare service operators	Business Model	Maintenance Providers (Local)
Business partners	Business ecosystem	Infrastructure subsystem	Manufacturers
Customer retention	Booking system	Motivations	Non-human artifacts (actants)
Sharing economy business models	Bike sharing users	Policy and economic instruments	Platform Provider

Source: Own Authorship (2021).

Next, considering the division of nodes into two groups (factors and actants), still separated between automatically and manually generated nodes, we created subcategories within each larger group to aggregate nodes related to each other and serve as a preview for the analysis categories. Thus, the nodes were grouped and

allocated to each corresponding subcategory in a simultaneous process of creating categories and allocating nodes.

Finally, we performed an overlap and comparison of the nodes coming from manual and auto-coded nodes. We did this for both groups: factors and actants, with the initial subcategorizations identified in each of them. This process served to identify the registration units or final codes. We applied the semantic criterion (thematic categories) and lexicon (grouping of words by their sense, considering synonyms and close meanings) through associations and equivalences (Bardin, 2011; KRIPPENDORFF, 2004). Table 18 shows some examples of this subcategorization, with the allocation of nodes in pre-categories.

Table 18 – Example of subcategorizing nodes in pre-categories

FACTORS			
BUSINESS	SERVICE QUALITY	CUSTOMER EXPERIENCE	SATISFACTION
<i>Service business model</i>	<i>System Availability</i>	<i>User perspective</i>	<i>Customer loyalty</i>
<i>Business partners</i>	<i>Service quality gap model</i>	<i>User participation</i>	<i>Creating customer loyalty</i>
<i>Sharing economy business models</i>	<i>Conceptual quality model</i>	<i>Customer services</i>	<i>User loyalty investigation</i>
<i>Business model innovation</i>	<i>Service quality measurement model</i>	<i>Customer retention</i>	<i>Customer loyalty chain</i>
<i>Business continuity management systems</i>	<i>Conceptual quality management models</i>	<i>Engaging customers</i>	<i>Customer loyalty perceptions</i>
<i>Business strategies</i>	<i>Customer service quality</i>	<i>Customer experience management</i>	<i>Customer loyalty perspectives</i>
<i>Business operations</i>	<i>Bike sharing service quality evaluation value</i>	<i>Customers repurchase intention</i>	<i>Customer loyalty programs</i>
<i>Successful businesses</i>	<i>Service evaluation process</i>	<i>Customer relationship management</i>	<i>Enhancing customer loyalty</i>
<i>Public-Private Partnerships</i>	<i>Unsatisfactory service quality</i>	<i>Customer relationship management system success</i>	<i>Enterprise customer loyalty</i>
<i>Pricing strategies</i>	<i>Conceptual service quality models</i>	<i>Customer feedback</i>	<i>Managing customer loyalty</i>
ACTANTS			
CUSTOMER/USER	ORGANIZATIONS	SERVICE PLATFORM	RELATIONSHIPS
<i>Customer</i>	<i>Carsharing organizations</i>	<i>Bike sharing service</i>	<i>Buyer–customer relation</i>
<i>Carsharing users</i>	<i>Business enterprise</i>	<i>Carsharing services</i>	<i>Customer-service provider relationships</i>
<i>Frequent users</i>	<i>Business organizations</i>	<i>One-way carsharing</i>	<i>Customer–supplier relationship</i>
<i>Active users</i>	<i>Bike sharing company</i>	<i>Product-service systems</i>	<i>Business networks</i>
<i>Current users</i>	<i>Carsharing companies</i>	<i>Carshare service network</i>	<i>Public-Private Partnerships</i>
<i>Bike sharing users</i>	<i>Business entrepreneurs</i>	<i>Actors—service platform</i>	<i>Actors Network Interaction</i>
<i>Customer demand</i>	<i>Business actors</i>	<i>Current sharing economy platforms</i>	<i>Actors in Mobility</i>

Source: Own Authorship (2021).

At last, the definition of this set of codes allowed its grouping into larger categories (analysis categories).

3.4.4.4 Definition of the analysis categories

Once the registration units were established, it was possible to group them into categories according to their proximity and relationship. Categories are a simplified representation of raw data and form classes that combine several elements grouped by their common characteristics. To define the categories in this study, we applied particularly the semantic (thematic categories) and the lexicon criterion (grouping words by their sense, considering synonyms and close meanings) through associations and equivalences (Bardin, 2011; KRIPPENDORFF, 2004). In addition, we conducted several groupings and exclusions, considering that the terminal categories come from the progressive regrouping of categories with a weaker generality and that a good set of categories must have the qualities as mentioned earlier: mutual exclusion, homogeneity, relevance, objectivity, fidelity, and productivity (Bardin, 2011).

Lastly, we named these units groups. The name of each unit grouping was designed to define that set of codes/registration units and to understand which aspects will be analyzed in each category, thus consisting of the analysis categories. Finally, the groupings of related categories allowed the identification of the general theme or the related context category.

Table 19 presents a summary of this process. It shows the path of abstraction from the smallest to the largest unit, from the codes that resulted from the automatic and manual surveys and their refinements in registration units to identifying the analysis categories and their respective context categories or themes.

Table 19 – Synthesis of the categorization process

MANUAL AND AUTO CODED NODES	REFINEMENTS AND ABSTRACTION	REGISTRATION UNITS	ANALYSIS CATEGORY DEFINITION
CONTEXT CATEGORY: Shared Mobility Service Design			
User perspective User participation Customer services Customer retention Engaging customers Customer experience management Customers repurchase intention Customer relationship management Customer feedback	User experience satisfaction Retention, repurchase or use recurrence Loyalty User engagement and participation Feedback - eWoM User journey Trust	Use experience (positive or negative) Satisfaction or dissatisfaction Customer retention: reuse and loyalty User rating (positive or negative)	User experience (Elements that interfere with the customer use experience)
Service quality Service quality measurement ES-QUAL Gap Service Quality Model Service evaluation process Analyzing service quality Service Quality Provision Communication Gap Assurance Empathy Platform Responsiveness Reliability	Reliability Responsiveness Security and privacy Empathy Tangible aspects System access and availability Flexibility Ease of use Internal and external communication	Reliability and performance consistency Guarantee / Trust / Competence Responsiveness Security and privacy Empathy Tangible aspects System or sharing platform access and availability Flexibility Efficiency and Ease of Use Communication and Customer Service	Service quality perception (Elements that interfere with the perception of service quality from the user's point of view)
Maintaining services Service process model Customer journey Customer journey canvas Backstage service processes User centric design Customer journey visualization tools Strategic design Touchpoint design	General maintenance Price Fees, tariffs Legislation Improvements Operation performance Customer Service	Maintenance, cleaning, and type of vehicle Price and tariffs Adequacy to Legislation and Incentives Continuous improvement Operation performance	Functional aspects of service operation design (Elements that interfere with the operation, to ensure correct and problem-free operation)
CONTEXT CATEGORY: Sharing Economy Model			
Service business model Business partners Sharing economy Business continuity Business strategies Successful businesses Public-Private Partnerships Price strategies Pricing Profitability	Business Model Canvas Partnerships Activities Pricing strategies One-way; free-floating Profitability Public-P2P, B2C, B2B Offer	Offer or Value Proposition Operating model (Key Activities) Partner network (partnerships) Customer segments/target audience - B2C Customer relationship Revenue Stream / Financial Model	Business model (Elements that interfere with service structuring and its operation over time)

MANUAL AND AUTO CODED NODES	REFINEMENTS AND ABSTRACTION	REGISTRATION UNITS	ANALYSIS CATEGORY DEFINITION
CONTEXT CATEGORY: Sharing Economy Model			
Actors in Mobility Customer- users (Internet) Service Platform Company- Organization Service Infrastructure Government-Public Authorities-Cities Maintenance Providers Manufacturers Non-human artifacts- vehicle Platform Provider Public Transport Operation Service Developer Service Enabler Society-Citizens Technology Developers Customer call center	User - consumer Service platform Service infrastructure Service operators Local maintenance providers Government and public authorities Suppliers and manufacturers Vehicle, Technology Website, app, GPS, reservation system Society - citizens Employees and customer service	User or customer Companies and organizations Support companies: local operation and maintenance Suppliers and manufacturers Technology Actors: Service application and system developers Vehicle Service Infrastructure Non-Human Actors Government and public authorities Society - citizens	<p style="text-align: center;">Mobility service network actors</p> <p style="text-align: center;">(Actors present and absent on the network)</p>
Value creation process Value co-creation Collaborative value creation Value co-destruction Collaborative processes Value (collaboration) network Customer-service provider Relationships	Value co-creation (Or Value co- destruction) Network collaboration and cooperation Service provider and user relationship Role of the central actor	Value co-creation Network collaboration and cooperation Value co-destruction	<p style="text-align: center;">Interaction processes or mechanisms between actors in the network</p> <p style="text-align: center;">(Relationship dynamics between actors from the user's perspective)</p>

Source: Own Authorship (2021).

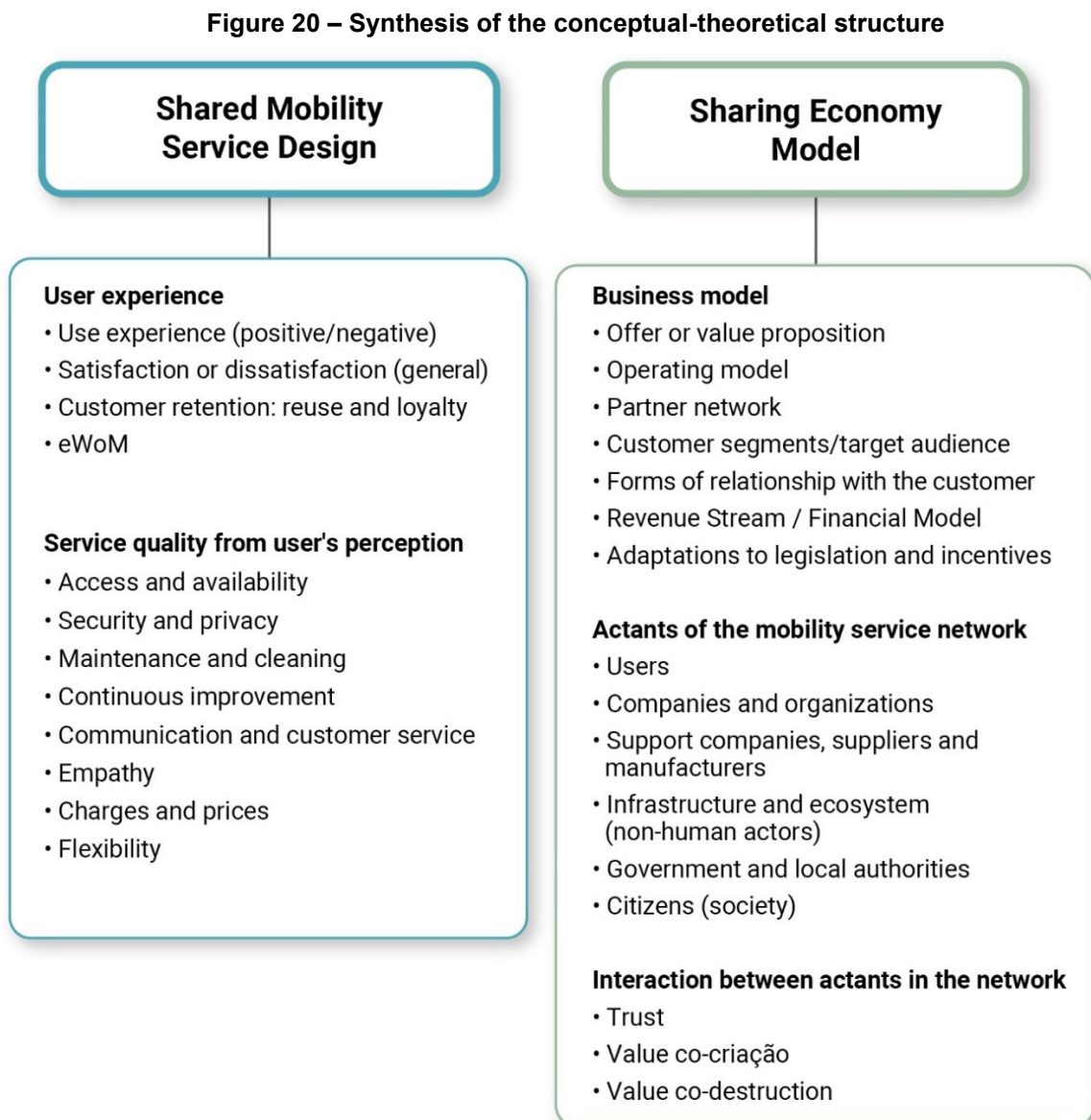
After the preliminary definition of the analysis categories and their respective registration units, we conducted the last stage of the inductive content analysis, which consists of validation.

3.4.5 Categories Validation and Proposition of the Conceptual-Theoretical Structure

To verify the reliability of the identified units and categories, we adopted internal validation procedures by comparing the categories with each other, checking that they were not overlapping or repeated, and considering how the data would be analyzed from the categories. Furthermore, we compared the adherence of each category and unit with the research objectives, particularly the specific objectives a) and b).

One of the limitations of this step is that it was not possible to carry out external validation procedures with an independent researcher to confirm the categories and units proposed from another perspective.

Finally, as a result of the inductive content analysis, we proposed the conceptual-theoretical structure, consisting of 2 main themes (context categories) and concentrating 5 analysis categories, which are subdivided into 28 registration units. Figure 20 illustrates the synthesis of categories and subdivisions.



Source: Own Authorship (2021).

After completing this first stage of the research, we proceeded to conduct the case studies.

3.5 CONDUCTION OF THE CASE STUDIES

According to Yin (2001), through the case study, it is possible to examine a social phenomenon in its natural environment by collecting and analyzing empirical material from specific social locations. It is an investigation method that allows the study of contemporary events in which the investigator has little or no control, enabling the identification of relevant variables about this event and the characterization of the dynamics of the relationships between these variables (Yin, 2001).

Based on the delimitation established for this research, presented in Chapter 1, we conducted the case studies based on selecting shared mobility services, more precisely carsharing services.

The procedures for conducting the case studies in this thesis followed these steps, detailed in the sequence: (1) case planning, involving case selection, the definition of analysis units, means, and collection instruments, from the creation of the research protocol, (2) conducting the pilot test, (3) collection of case data, and (4) analysis of the collected data.

3.5.1 Selection and Definition of Cases Sample

In a case study, the sample size guarantees a greater or lesser degree of confidence regarding the falsifiability of the results, based on the number of cases to be studied (Santos et al., 2018). Therefore, we selected six case studies for this thesis, characterized by six carsharing service providers. Thus, the research consists of a multiple and representative case study, with the stratified selection of cases, seeking generalization to specific groups of a particular population (Santos et al., 2018).

Belk (2014a) states that emerging carsharing companies are increasingly common in the carsharing mobility segment. Therefore, to contribute to the selection of a sample of significant cases and to allow for the comparison of data with each

other, several inclusion criteria were defined for selecting the carsharing cases, as follows:

- a) **As to the target audience:** we selected only companies in the B2C modality, that is, the company provides the service to the consumer (business-to-customer). Therefore, our cases did not include business-to-business services (B2B) or customer-to-customer (C2C or P2P) modalities.
- b) **Regarding geographic location and coverage area:** we decided not to select carsharing cases from eastern countries such as China and Russia, due to their different economic model, which could interfere in data analysis and comparison. Furthermore, the language of the country of origin was a selection criterion. For this reason, we selected cases from North America, Latin America, and Europe, as they present similar business models for comparing their characteristics. Except for Brazilian cases, with activities concentrated in cities such as São Paulo, we also sought to select companies that operate in several cities and countries.
- c) **Considering the operating period:** we only selected companies with a history of operation for a minimum of 5 years to guarantee a greater volume of data collected.

Initially, we identified 28 carsharing companies. However, six case studies were selected based on the established criteria, all in the B2C modality, located in Europe or North and South America. Regarding the period of operation, all six have more than five years of operation. Of these, three are cases of continuity, as they are still in operation, and three are cases of interruption, as they had their activities closed but operated for at least five years. The six cases are listed in Table 20, constituting the intentional and representative sample of the research study cases.

Table 20 – Sample of the six selected case studies

Case	Country of origin	Year of foundation or period of operation	Countries served
Case A	Germany	2008-2019	Europe and e North America
Case B	Canada	1994	13 cities in Canada and Paris, France
Case C	Germany	2011-2019	31 cities in 14 European countries
Case D	Germany	2001	Germany, Italy, and Switzerland
Case E	Brazil	2010-2019	São Paulo
Case F	USA	2000	USA, Canada, Costa Rica, Iceland, Taiwan, Turkey, and the United Kingdom

Source: Own Authorship (2021).

Here we highlight an observation regarding the cases operation period. Although cases B, D, and F had a longer operation period than the others, the platforms from which the data were collected (Twitter and Yelp) only emerged from 2004 onwards. In addition, case data collected on these platforms are only representative from 2009, so the coverage period for data collection was similar for all cases.

Therefore, we also established the analysis units and the means of data collection for the investigation of these six selected cases.

3.5.2 Analysis Units and Means for Data Collection

After defining the cases to be studied, it is necessary to establish the analysis units and the data sources to be collected on the cases (Yin, 2001). Martins and Belfo (2010) and Yin (2001) suggest that for the study to be more rigorous, the empirical materials collected should consider at least two data sources to enable data triangulation.

Therefore, we established the following analysis units and data sources:

- a) Secondary data collected from user publications on selected carsharing cases on Twitter social network and the Yelp ratings website. Thus, this unit

of analysis constitutes the tweets and consumer evaluations about the carsharing services studied.

- b) Primary data collected from an online questionnaire survey. These questionnaires were sent to three groups of participants:
 1. Users of carsharing services.
 2. Companies from the selected case studies.
 3. City halls in Brazilian capitals that have implemented or announced the offer of carsharing services in their cities by 2020 (the selection of city halls located only in Brazil was due to geographic convenience and the greater possibility of returning responses).
- c) Secondary data from the cases studied, which served as a complement to the primary data, being collected from the literature and websites of the selected companies.

Twitter was chosen as a data collection and source field because of its rise as one of the most influential and popular social media platforms today. Originated in 2006, Twitter produces an effective electronic word of mouth (eWoM) when individuals express their opinions and feelings that impact other social network members through posts of up to 280 characters, called tweets (Aroean, Dousios, and Michaelidou, 2019). According to the Omnicore website (Omnicore, 2020), 34% of all Twitter users are female, while 66% are male, and the United States is the country with the most active users on this social network (Tankovska, 2021). Furthermore, the platform's audience tends to be young, with 37% of users between 18 and 29 years old and 25% between 30 and 49 years old. An initial comparison can be made with the profile of the carsharing service users, which also tend to be young, with the most representative age group between 25 and 39 years old (Kumar, Lahiri, and Dogan, 2018 Möhlmann, 2015).

Moreover, Twitter was chosen as the field and source of collection for (i) having advanced search engines made available by the platform itself, which contributed to the research process, (ii) point out everything that has already been discussed about a particular subject or company, even if the company has ended its activities, (iii) it is one of the most used platforms in data collection that consider user publications as part of the assessment for content analysis, applied in studies such

as those by Aroean, Dousios, and Michaelidou (2019); Chang and Wang (2018); Liang, Choi and Joppe (2018) and Park (2011).

In addition to data collected via Twitter, we collected data on Yelp, considered one of the leading international platforms for evaluating local businesses in cities worldwide, inaugurated in 2004 (Yelp, 2020). According to Chang and Wang (2018), the Yelp review site emerged as a way for people to express themselves anonymously and conveniently on the Internet, helping consumers in their purchase decisions or contracting services. We chose Yelp because it is an international platform, thus covering almost all selected cases and presenting more specific assessments on situations of carsharing services use, with recommendations or complaints about the cases studied. In addition, the website has already been mentioned and applied in research such as Luo and Tang (2019) and Yamada (2019).

We collected these online data from Twitter and Yelp by applying the techniques and strategies suggested by netnography (Kozinets, 2002), detailed in section 3.5.4. Although netnography can be used as a general method to conduct research, in this study, we chose to adopt the procedures suggested by netnography specifically for the collection of online data. Netnography was chosen because it presents less intrusive and more flexible procedures compared to focus groups and in-person interviews, and it can be conducted using consumer observations in a context that is not manufactured by the researcher. Furthermore, it provides possibilities for identifying behaviors that occur naturally, such as information searches and Word-of-Mouth discussions among consumers (Kozinets, 2002).

Another source of data was the survey through questionnaires. This type of instrument was chosen for several reasons (Lakatos and Marconi, 2003), such as:

- a) The possibility of reaching more respondents at the same time.
- b) It covers a wider geographic area. Considering that the case studies are from six companies located and operating in different countries, the sending of online questionnaires allowed for wider dissemination, also by allowing them to be sent in different languages.
- c) Consists of a faster and more objective way to obtain answers.
- d) Respondents feel more secure to answer due to anonymity.
- e) There is a lower risk of answers distortion, due to the lack of influence of the researcher.

- f) It is a more flexible collection instrument, allowing the respondent to choose the time and place that is most favorable to them.

Thus, this set of analysis units aimed to collect data from the users' perspective, companies, and city halls on the operation of carsharing services. The collection of these data also aimed to identify perceptions not only of consumers but also of other actors participating in the solution-demand network of shared mobility services. Thus, it helps to identify critical and relevant factors in the operation of carsharing services for each defined group of respondents. Table 21 summarizes the relationship between the analysis units, the means and collection instruments established for each group of actors, and the justification for these choices.

Table 21 – List of analysis units and collection instruments for each respondent group

Respondent group	Users	Companies	City Halls
Collection instrument	Collecting online comments on Twitter and Yelp Survey through online questionnaire	Survey through online questionnaire	Survey through online questionnaire
Analysis unit	Tweets and reviews Answers to the questionnaire	Answers to the questionnaire	Answers to the questionnaire
Justification	Contribute to the users' perception of the factors and actors in carsharing services operation	Identify the companies' perception of certain aspects related to carsharing services operation	Identify the perception of city halls about certain aspects related to carsharing services operation in the cities

Source: Own Authorship (2021).

To collect these data, it was also necessary to elaborate the instruments and collection strategies, starting from constructing a research protocol.

3.5.3 Research Protocol

Considering that the case study investigation “benefits from the prior development of theoretical propositions to conduct data collection and analysis” (Yin, 2001, p. 33), the research protocol was built from the conceptual-theoretical structure

(Section 3.4.5). Each collection and analysis variable were established from the analysis categories and recording units defined in the framework.

Thus, the research protocol details the case study procedures, describing the collection techniques, instruments, and variables for analysis (Yin, 2001), detailing how each registration unit will be collected and analyzed. The research protocol with all these details is provided in Appendix A.

3.5.4 Online Data Collection Strategies through Netnography

In parallel to the protocol development, we outlined strategies for collecting data online through netnography (Kozinets, 2002; Parolin, 2018; Sthapit and Björk, 2019). Table 22 summarizes the adopted procedures, considering four steps.

Table 22 – Details of predefined steps and strategies for data collection by netnography

Step	Recommended procedures for conducting netnography	Strategies applied in the research
1 Entry	Identify potential communities and select one or several for data collection, based on the research objective and question	Selection of collection sites: Twitter and Yelp, and definition of the data to be collected: Tweets and user reviews on carsharing services
	Learn as much as possible about the platforms, groups, and individuals before starting data collection	Familiarization with the collection field Registration and insertion of the researcher in the online research field, navigating to understand it
	Entry of the researcher into the field. Collecting data by observing community interaction, developing an internal understanding of the community's culture	Profile creation on platforms Presentation as a researcher and with the research objectives Non-participant observation
2 Collection and analysis	Two types of data: - the data that the researcher copies directly from the members of the online community (comments, publications, tweets, ratings) - the data that the researcher annotates about their community observations, interactions, and meanings	Searches were performed for each case study, by year, and all data resulting from these searches were imported into NVivo. Simultaneously with collection and analysis, initial perceptions were recorded (logbook, notes, and insights during the collection and analysis process).
3 Provide reliable interpretation	Certify the legitimacy of user participation, seeking ways to ensure user validity. The assessment should focus on the user's behavior on the Internet, not the user per se.	Establishment of criteria for comment collection and selection of: Publications of individual accounts, excluding accounts from corporate pages

Step	Recommended procedures for conducting netnography	Strategies applied in the research
<p style="text-align: center;">4 Ethics of the researcher's role</p>	<p>The researcher should fully disclose their presence, affiliations, and intentions to members of the online community during the research and should ensure confidentiality and anonymity of the collected data.</p>	<p>Presentation as a researcher in the field, presentation of the research and its objectives</p> <p>Of all the online comments collected, only their content was considered, without mentioning the author of the publication and preserving user anonymity.</p>

Source: adapted from Kozinets (2002), Parolin (2018), and Sthapit and Björk (2019).

In addition to defining the means for collecting online comments, we also developed instruments for collecting data through questionnaires.

3.5.5 Preparation of Collection Instruments

Still in parallel with the research protocol development, we constructed the collection instruments, consisting of three different online questionnaires, which were sent to the three groups of participants: (1) users, (2) companies, and (3) city halls of Brazilian capitals.

We developed the three questionnaires based on the theoretical framework, and the questions are directly related to the analysis categories and registration units defined in the conceptual-theoretical structure (Figure 20). These categories also form the basis of the research protocol.

Questionnaire 1 consisted of the collection instrument sent to users of carsharing services, composed of 19 questions. Considering that the selected companies operate in several countries and cities, we decided to make questionnaire 1 available in the following languages: Portuguese, English, French, German, Spanish and Italian. The translation of questionnaire 1 into these six languages aimed to expand the scope and possibility of answers, seeking to make the questionnaire available in the mother tongue of the countries where the studied carsharing services operate. Users of all nationalities, aged over 18, with active Twitter and Facebook accounts³, who have already used B2C carsharing services at

³ Twitter and Facebook platforms were the online questionnaires sharing networks for recruiting participants.

least once, were recruited to participate in the survey. Of these, recruited people who were not sufficient in the languages the questionnaires were made available (Portuguese, Spanish, English, Italian, French, or German) were excluded from the research. In addition, carsharing users from companies established in Russia, Asia, Africa, and Oceania were also not included in the research.

Questionnaire 2, on the other hand, consisted of the collection instrument sent to those responsible for the companies of the selected case studies, consisting of 18 questions. As in questionnaire 1, considering that the companies studied come from different countries, questionnaire 2 was made available in the following languages: Portuguese, English, French, and German.

Finally, questionnaire 3, composed of 9 questions, consists of the collection instrument sent to city halls in Brazilian capitals that already have projects to implement carsharing services in their cities. Therefore, city halls in Brazilian capitals that have not implemented or have not yet announced the implementation of carsharing services in their cities until 2020 were excluded from the survey. We chose to select only city halls in Brazilian capitals due to geographic convenience and the greater chance of obtaining answers. Furthermore, the objective of including city halls as a respondent group in the questionnaires was due to the possibility of including the perception of another actor in the carsharing service network, with the role of public manager and with a more focused view of the impacts of these services on mobility and urban territory.

Questionnaires 1, 2, and 3 are presented in Appendices D, E, and F.

Table 23 summarizes the inclusion and exclusion criteria related to each of the questionnaires and the details developed for each recruited participant group.

Table 23 – Details of the three survey collection instruments

Criteria	Questionnaire 1 Users	Questionnaire 2 Companies	Questionnaire 3 City halls
Inclusion criteria	The survey included users of all nationalities over 18 years old, with active Twitter and Facebook accounts, who have already used carsharing services at least once	The survey included companies that provide carsharing services in the B2C modality, selected as research case studies	The survey included city halls in Brazilian capitals that have or have already announced the implementation of carsharing services in their cities

Criteria	Questionnaire 1 Users	Questionnaire 2 Companies	Questionnaire 3 City halls
Exclusion criteria	We did not include in the survey persons recruited who are not sufficiency in the languages in which the questionnaires will be made available. Another exclusion criterion is users of carsharing services from companies established in Russia, Asia, Africa, and Oceania, or people who have not used B2C carsharing services	We did not include in the survey companies that were not selected as case studies or were not mentioned by users in their responses	We did not include in the survey the city halls of Brazilian capitals that have not implemented or have not yet announced the implementation of carsharing services in their cities by the year 2020
Available languages	Portuguese English Spanish German French Italian	Portuguese English German French	Portuguese
Number of questions	18	15	9
Type of questions	Fixed alternatives Multiple-choice	Open and multiple-choice answers	Open and multiple-choice answers

Source: Own Authorship (2021).

Before initiating data collection, we submitted the research project for evaluation of the Ethics Committee for Research with Human Beings at UTFPR, under the certificate for ethical review number 37749020.1.0000.5547, approved in September 2020. Thus, we started the survey of primary data only after the Committee's approval.

Regarding the expected sample size for the responses to the questionnaires, we understand that as this is a qualitative study, the probability sampling techniques applied in quantitative research are rarely appropriate to conduct qualitative research (Marshall, 1996). Furthermore, determining the qualitative sample size a priori is a complex approach, especially in the more interpretive qualitative research models (Braun et al., 2020). This happens because the sample size is shaped by several factors, such as the scope of the study and the breadth of the topic, the research question, the characteristics and diversity of the population, the motivation of the participants. Some of these factors cannot be fully anticipated in advance, and the richness of the dataset and the ability to address the issues becomes more critical considerations for the final results than reaching an exact number (Braun et al., 2020).

3.5.6 Means of Research Control

Due to the large volume of information resulting from the procedures defined for data collection and considering different data sources from the six different case studies, it is necessary to define means to control the research (Santos et al., 2018). In this sense, NVivo was used as a digital storage platform for the collected data, particularly the online comments from Twitter and Yelp. The questionnaires were prepared and sent through the Google Forms tool, which stores the answers online. After collecting the answers, they were imported into Excel spreadsheets. In addition to storing the information collected, we later used NVivo to conduct the pre-analysis, coding, and data analysis.

Likewise, the research protocol also constitutes a document that served as a roadmap for data collection and analysis.

3.5.7 Conducting Pilot Test and Pre-Analysis

Before starting the effective case study data collection and analysis, it is recommended to carry out pilot tests to validate the application procedures, verify data quality, and make any adjustments to the protocol and collection strategies (Yin, 2001). These adjustments can be either in the language of the collection instruments, the number of questions, or the change in the collection and observation criteria (Santos et al., 2018).

Thus, we conducted the pilot test by collecting a portion of online comments from three different cases. We performed coding and pre-analysis procedures based on the variables established in the protocol to verify data quality and the indications for the analysis.

Likewise, while elaborating the three questionnaires, we carried out pre-tests by applying some samples in a small chosen population, with similar characteristics, but without being the study target (Lakatos and Marconi, 2003). In addition, we conducted pilot tests of the questionnaires with native speakers of each of the six

languages to check the questions of the instruments in each language, checking for misinterpretations and implementing the questionnaires as needed.

After performing the pre-analysis tests, we were able to continue with actual data collection both by netnographic techniques and by surveying through questionnaires.

3.5.8 Online Data Collection through Netnography

We collected data using netnographic procedures on Twitter and Yelp platforms. Before starting the collection, we tried to get used to the field, explore, and learn about the platforms, groups, and individuals studied.

We used Twitter's "Advanced Search" option to collect users' tweets about the carsharing companies, with searches performed for each case study. As strategy and filters, we performed combination tests using the direct mention of the company (@companyname) and the hashtag (#companyname). We applied this filter because we found out that the use of only one of the options (mention of the company or hashtag) returned an enormous volume of results, and many were not relevant considering the objectives of the search, which was to find tweets commenting on aspects of use and operation of the service. However, we could not use these filters in cases where the combination did not return results or when the company account was no longer active. For these cases, one of the two options was used (mention or hashtag).

For the searches time delimitation, first, we considered Twitter's year of inauguration (2004). However, after initial searches, we realized that most carsharing companies only joined the platform in 2009. Thus, we considered the year the company joined Twitter, until the year of its closure, or until July 2020 for companies that are still active. Due to the large volume of data returned in searches, we conducted separate searches per year.

For the Yelp reviews, we carried out searches with each of the carsharing cases named combined with the city of origin of each company. The city was necessary because it is a limitation of the platform's search, which requires a place to collect the data. We chose to use the city of origin, as it is where the company

operates for the longest time, with the greatest return on results. For searches on Yelp, it was unnecessary to limit the time, as the platform shows the results from the year in which there are reviews of that company. We found Yelp reviews for three of the six companies studied. Table 24 summarizes the search strategies applied on Twitter and Yelp, showing the time limits for each case.

Table 24 – Summary of searches performed on Twitter and Yelp

Case	Country of origin	Period of operation	Twitter search description	Yelp search description
Case A	Germany	2008-2019	(@caseA) (#caseA) Data collected from 10-07-2009 to 31-07-2020	"Case A" City: Berlin, Germany 16 reviews (2012-2019)
Case B	Canada	1994-present	(@caseB) (#caseB) Data collected from 08-2009 to 31-07-2020	"Case B" City: Montreal, QC, Canada 11 reviews (2012-2020)
Case C	Germany	2011-2019	(#caseC) Data collected from 10-2015 to 11-2019	"Case C" City: Munich, Germany 0 reviews
Case D	Germany	2001-present	(@caseD) Data collected from 09-2009 to 31-07-2020	"Case D" City: Frankfurt, Germany 0 reviews
Case E	Brazil	2009-2019	(@caseE) Data collected from 09-2009 to 28-11-2019	"Case E" City: São Paulo 0 reviews
Case F	USA	2000-present	(@caseF) Data collected from 01-2009 to 31-07-2020	"Case F" City: Boston, MA, USA 302 reviews (2005-2020)

Source: Own Authorship (2021).

We stored the data collected in this first scan in NVivo for later filtering, encoding, and analysis as a means of research control. During the searches, we also took notes and initial perceptions about the data we found and collected. Tables 25 and 26 show the total number of tweets and Yelp reviews we collected, respectively, tabulated by case and year.

Table 25 – Results of tweets collection by case and by year

Year	Case A	Case B	Case C	Case D	Case E	Case F
2006	0	0	0	0	0	7
2007	0	0	0	0	0	120
2008	0	0	0	0	0	22
2009	108	50	0	21	80	399
2010	460	186	0	62	138	798
2011	664	466	0	150	316	1.220
2012	1.162	470	0	252	414	1.202
2013	1.200	460	0	246	381	1.104
2014	1.200	504	0	205	79	1.192
2015	1.325	520	191	276	20	1.223
2016	1.275	525	703	383	18	1.078
2017	1.250	546	740	462	98	1.029
2018	1.200	620	802	368	237	1.032
2019	1.225	567	820	315	192	1.021
2020	140	336	12	171	10	570
Total per case	11.209	5.250	3.268	2.911	1.983	12.017
Total of tweets	36.638					

Source: Own Authorship (2021).

Table 26 – Results of Yelp reviews collection by case and by year

Year	Case A	Case B	Case C	Case D	Case E	Case F
2005	0	0	-	-	-	2
2006	0	0	-	-	-	11
2007	0	0	-	-	-	17
2008	0	0	-	-	-	21
2009	0	0	-	-	-	20
2010	0	0	-	-	-	21
2011	0	0	-	-	-	24
2012	0	1	-	-	-	19
2013	2	0	-	-	-	14
2014	2	1	-	-	-	13
2015	0	0	-	-	-	20
2016	4	2	-	-	-	22
2017	1	1	-	-	-	22
2018	4	2	-	-	-	24
2019	3	1	-	-	-	35
2020	0	3	-	-	-	18
Total per case	16	11	0	0	0	302
Total of reviews	329					

Source: Own Authorship (2021).

After importing all data collected by netnography into NVivo, we performed the reading and first filter, simultaneously with the codification process, based on the proposed conceptual-theoretical structure. This process is explained in section 3.6.1 Deductive Content Analysis. During the reading, we took several notes, registering the perceptions about each case from the collected data, observations about the actors and their interactions in the network. We also used these annotations later on in the analysis stage.

Another collected data source was the response to questionnaires sent to users of carsharing services, companies in the cases studied, and city halls in Brazilian capitals that already have carsharing services implemented in their cities. Next, we show the results of collection by questionnaires.

3.5.9 Data Collection by Survey

We applied the questionnaires simultaneously to the online data collection through netnography. We recruited the participants in two stages: first, the users (participants in group 1), and then, the participants in groups 2 and 3.

We invited potential users of carsharing services by Twitter and Facebook social networks, with a link to access the questionnaire in Google Forms. After recruitment, we perceived that the number of completed questionnaires was low. Therefore, we adopted another strategy for recruiting and disseminating the questionnaires: first, we located users of the case studies by their comments on Twitter and Facebook. Then, based on these comments, we contacted them by replying to these comments, introducing us as researchers, and inviting the user to participate in the research, providing the link to the questionnaire. This procedure was done by locating different users, sending the questionnaires in the respective language of publication of the localized comment for contact.

For the recruitment of the case study companies, we contacted them by institutional emails available on their websites, with an explanation about the research, the Google Form link, and an attachment with an authorization letter to be filled out by the company. In a second moment, we also attempted contact with these carsharing companies through social networks, through direct messages on the profiles of the services' official pages.

Finally, we recruited the third group of respondents. After a survey to identify Brazilian capitals with carsharing services in operation or a proposal for implementation, we raised eight capitals. We then identified the secretariats, agencies, or public sectors responsible for the city mobility, infrastructure, or urban transport. Thus, we made contact via e-mail with these eight city halls, including the research's explanation, the Google Form link, and an attachment with an

authorization letter to be filled in by the city agency. Next, we present a summary of the results obtained for each questionnaire.

3.5.9.1 Survey of questionnaires sent to carsharing users

Table 27 shows all responses received from users, separated by the questionnaire language. Of the total responses, some were discarded for not meeting the inclusion and exclusion criteria (as in the case of users who responded about using Uber or carsharing services in the P2P modality). Thus, only valid responses were considered for analysis.

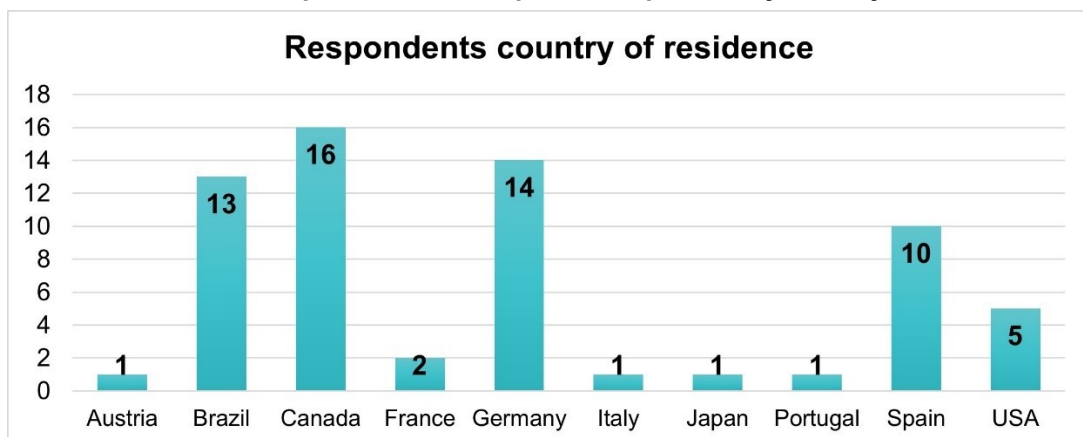
Table 27 – Total responses of the questionnaire sent to carsharing users

Language	Answers received	Answers discarded	Valid answers
Portuguese	24	6	18
English	26	8	18
Spanish	8	0	8
French	10	5	5
German	17	2	15
Italian	1	1	0
TOTAL	86	22	64

Source: Own Authorship (2021).

From the 64 valid responses, it is possible to separate respondents according to their country of residence, as shown in Chart 1.

Chart 1 – User questionnaire responses separated by country of residence

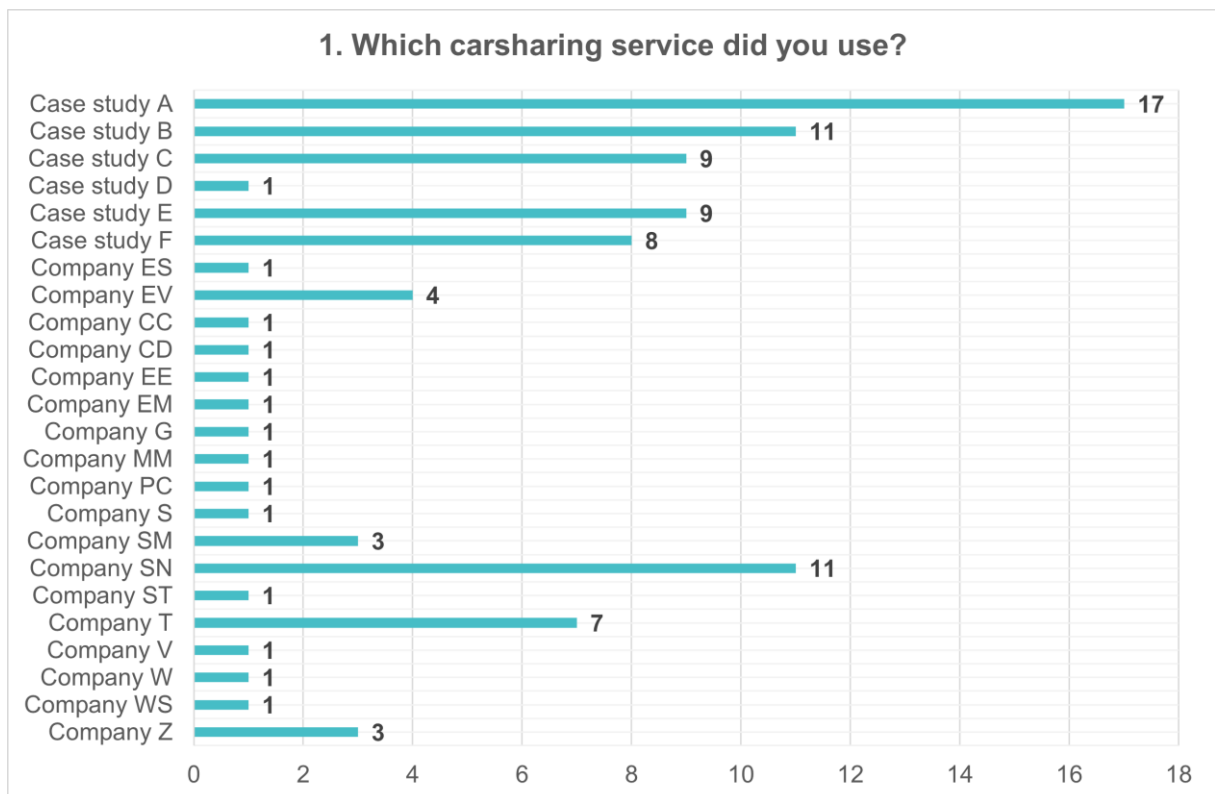


Source: Own Authorship (2021).

We can note that there is a more significant number of responses from residents of Canada and Germany. We infer that this is because most carsharing services originated in these countries and have a wider area of operation in these locations. Residents of Brazil also had a significant number of responses, possibly because it is the researcher's country of residence, contributing to greater dissemination of the questionnaire.

Users' responses were also separated according to the mentions of the most used carsharing service companies (Chart 2).

Chart 2 – Carsharing companies mentioned in user responses



Source: Own Authorship (2021).

From this chart, we can see that the company referring to case A was the most mentioned by users. Despite having its services terminated in 2019, company A was one of the leading companies operating in Europe and North America, thus relating to a more significant amount of responding users in these regions. Other prominent companies operating in Germany and Canada were also mentioned. Finally, regarding Brazilian respondents, companies E and T were mentioned.

3.5.9.2 Survey of questionnaires sent to carsharing companies

We sent the questionnaires to the six selected case studies, but the companies did not return their responses. Some companies replied that the questionnaire would be forwarded to the responsible sector or employee, while others did not return the contact. Some even stated that it is company policy not to respond to any type of survey. Thus, no responses were obtained to the questionnaires sent to the case study companies.

Therefore, we sought other data sources for some of the information about these companies that would be obtained through the questionnaires, using the variables established in the research protocol as a starting point. Some of the aspects were identified in the tweets themselves, both from users and companies, as the company also has its profile on social networks and can respond to customer requests. Furthermore, we also carried a complimentary search of secondary data in the literature, the companies' official websites, and news websites. Thus, we collected some of the information about the business model, services operation, and main partners by other means. However, we could not obtain all the answers to more specific questions about how the company deals with certain aspects of users.

3.5.9.3 Survey of questionnaires sent to city halls

Of the eight city halls to which we sent the questionnaires, four returned with the answer. Table 28 shows the list of municipalities identified as having carsharing projects in progress, already implemented, or in the process of being implemented in the city, and which ones responded to the questionnaire.

Table 28 – Responses to the questionnaire sent to Brazilian capitals city halls

CAPITAL-STATE	PUBLIC AGENCY RESPONSIBLE FOR MOBILITY IN THE CITY	STATUS
Fortaleza-CE	Secretariat of Conservation and Public Services of the Municipality of Fortaleza-CE (SCSP)	Answered
Recife-PE	Department of Economic Development, Science, Technology and Innovation of Recife-PE (SDECTI)	Answered
Belo Horizonte-MG	Transport and Transit Company of Belo Horizonte (BHTRANS)	Answered
Curitiba-PR	Institute for Research and Urban Planning of Curitiba (IPPUC)	Answered
Brasília-DF	Department of Transport and Mobility (SEMOB)	Not answered
Vitória-ES	Department of Transport, Traffic and Urban Infrastructure	Not answered
São Paulo-SP	Department of Mobility and Transport Municipal Department of Works and Infrastructure (SMOBI)	Not answered
Rio de Janeiro-RJ	Municipal Department of Transport – SMTR	Not answered

Source: Own Authorship (2021).

Thus, after collecting all the data, both from the Twitter and Yelp online comments and from the responses to the questionnaires, we continued with the last stage of analysis of these collected data.

3.6 ANALYSIS OF COLLECTED DATA

We performed data triangulation to contribute to the research validity and reliability criteria. Data was collected from different sources of information (CRESWELL, 2002). According to Santos et al. (2018, p. 103), the data analysis step in the case study method consists of the “examination, categorization, tabulation, tests and recombined evidence to obtain conclusions regarding the research problem and objectives.”

Yin (2001) recommends starting with a general analytical strategy, setting priorities for what should be analyzed and for what reasons, beginning with the variables and metrics established in the research protocol. Yin (2001) also suggests starting with the smaller questions, inferring conclusions from the evidence, continuing with the bigger questions until considering the main research questions.

One of the strategies for this analysis is to organize the data in chronological order. Thus, events can be organized into patterns of cause and effect due to their recurrence (Yin, 2001). Therefore, firstly, we analyzed the case studies based on their history, elaborating a narrative of events in chronological order to each of the cases.

Another strategy is to create a categories matrix to identify evidence from these categories. To explain this step more systematically, Yin (2001) suggests adopting some main procedures:

- a) Reduce data, eliminating what is not relevant, only keeping what will be effectively analyzed.
- b) Create a categories matrix and arrange evidence in these categories.
- c) Identify causalities and the logic that links data to propositions.
- d) Produce a narrative.

Therefore, based on these recommendations, we analyzed the collected data from the conceptual-theoretical structure established in step 1 of the case study method and from the propositions and criteria defined for data analysis according to the research protocol. We conducted this procedure through deductive content analysis.

3.6.1 Deductive Content Analysis

Resuming the phases of content analysis (Bardin, 2011; Erlingsson and Brysiewicz, 2017), we developed the deductive content analysis in three phases: (1) Preparation, (2) Organization (coding and categorization), and (3) Report production of the results analysis process.

3.6.1.1 Preparation phase of deductive content analysis

The preparation phase consisted of data collection via Twitter, Yelp, questionnaires, and general reading of this material. First, we imported online data collected from Twitter and Yelp in PDF format files into NVivo software. Then, we separated them by the six cases studied and organized them chronologically, from the year of the first publications collected until 2020 or the year of closing for cases of interruption. Next, in NVivo, we created “nodes” corresponding to the analysis

categories and registration units established in the conceptual-theoretical structure. Then we were able to code and correlate the content of these collected online data into one or more registration units. Figure 21 shows an example of the NVivo interface at this stage of preparation and the beginning of the coding process.

Figure 21 – NVivo interface example in the analysis preparation phase

Name	Files	References
SHARED MOBILITY SERVICE DESIGN	0	0
1 User experience	1	2
1.1 Use experience (postive or negative)	242	309
1.2 Satisfaction or insatisfaction (general)	91	117
1.3 Customer retention - reuse and loyalty	137	161
1.4 eWoM	211	302
2 Service quality from user's perception	0	0
2.1 Trust	80	89
2.2 Security and privacy	53	62
2.3 Empathy	37	46
2.4 Access and use (App, conection, card)	365	527
2.5 Service area (availability)	237	307
2.6 Flexibility	86	96
2.7 Communication and customer service	409	608
2.8 Maintenance and cleaning	101	120
2.9 Charges, prices, and discounts	161	238
2.91 (2.10) Continuous improvement	44	55
2.92 (2.11) General use	11	13
SHARING ECONOMY	0	0
3 Mobility service business model	0	0
4 Actants of the mobility service network	0	0
5 Interaction between actants in the network	0	0

Source: Own Authorship, using NVivo software (2021).

As for the questionnaires, we tabulated the received responses in two Excel spreadsheets, considering the answers from users and city halls. Although the users' questionnaires were answered in six different languages, in the end, the responses were all tabulated together, as shown in the example in Figure 22.

Figure 22 – Example of questionnaire responses tabulation

7. In your perception, does this carsharing company guarantee your physical well-being?	8. Do you consider this carsharing company treats its customers with empathy and respect?	9. How do you rate the price charged for using this carsharing service?
Yes	Yes	Adequate – fair price for the service provided
Yes	No	High – excessive price not justified
I don't know	More or less	Adequate – fair price for the service provided
I don't know	No	High – excessive price not justified
No	More or less	High – excessive price not justified
More or less	Yes	Adequate – fair price for the service provided
No	No	Adequate – fair price for the service provided
More or less	More or less	Adequate – fair price for the service provided

Source: Own Authorship (2021).

After we had prepared the collected data, we started to code it.

3.6.1.2 Coding and categorization phase of deductive content analysis

The second phase consisted of coding and categorizing the data collected in the categories proposed from the analysis matrix defined in the inductive content analysis, following the research protocol. During the coding process, we took notes of the perceptions and insights that contributed to the analysis stage and suggestions for adjustments to the codes and categories of the proposed model. Figure 23 shows an example of NVivo's interface with this process of online comments coding from the registration units and analysis categories.

Figure 23 – Example of coding process for online comments in NVivo

The screenshot displays the NVivo software interface. On the left, a 'Nodes' panel shows a hierarchical tree structure of coding categories. The main area on the right shows the content of a selected node, '1.1 Use experience (postive)', which includes a text excerpt and a reference link.

Name	Files	Referen
SHARED MOBILITY SERVICE DESIGN	0	0
1 User experience	1	2
1.1 Use experience (postive or negative)	242	309
1.2 Satisfaction or insatisfaction (general)	91	117
1.3 Customer retention - reuse and loyalty	137	161
1.4 eWoM	211	302
2 Service quality from user's perception	0	0
SHARING ECONOMY	0	0
3 Mobility service business model	0	0
4 Actants of the mobility service network	0	0
5 Interaction between actants in the network	0	0

1.1 Use experience (postive)

180, which oftentimes makes them more affordable to get has usually been really helpful, letting me know if someone was running low. Aside from the occasional smoked-in car, cars are fun to drive and well taken care of.

Reference 2 - 0,96% Coverage

Circa 2004. I'm sitting in a Rav4 EV, my first experience with it would have made my Czech father [who taught me my first screwdriver up your mother's ass] cringe with shame. I had friend was returning to the states after an arduous, emotional car would NOT start!

I followed all the directions: remove charger, make sure the NOTHING. Repeat steps. NOTHING. Twenty minutes later..

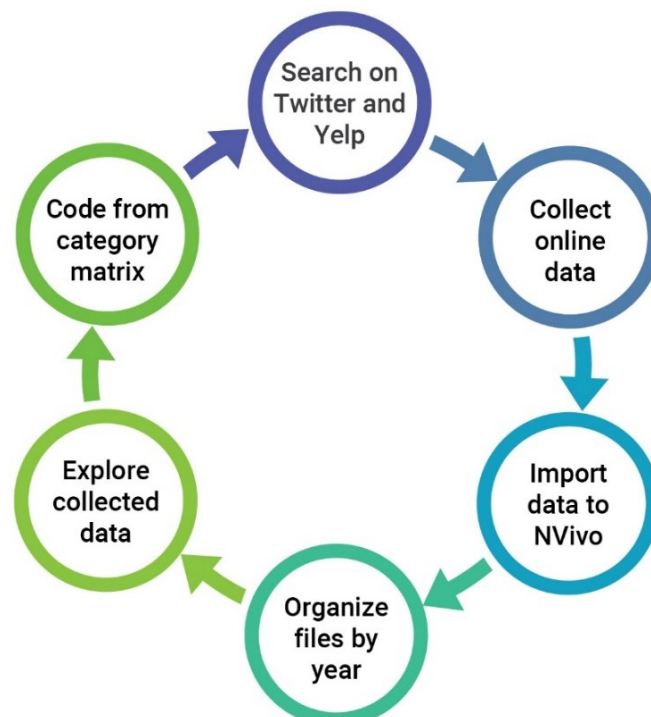
Source: Own Authorship, using NVivo software (2021).

The process was carried out systematically for all case studies, consisting of reading and filtering the comments, considering only the tweets and reviews on aspects of using carsharing services and related to the research objectives. Thus, we read these data seeking to codify the factors related to shared mobility services operation and the mentions of network actants and their interactions, according to the 5 categories and 28 codes defined in the theoretical model.

We considered Tweets and Yelp reviews published by users in the same languages as the data collection instruments (Questionnaire 1): Portuguese, English, French, German, Spanish, and Italian. We translated the tweets in foreign languages into Portuguese during reading and encoding to facilitate the analysis.

We considered in the coding the tweets made by users (individual accounts) who commented with problem reports, compliments, or questions about the use of carsharing services. We also considered the replies from the carsharing company to these users. We also identified advertising posts such as events about the services. For these, the content of the advertising itself was not analyzed but served to identify other actants present on the network, such as partner companies, in disseminating the company and service. Figure 24 summarizes the process of collecting, importing, organizing, reading, and coding the Twitter and Yelp online comments.

Figure 24 – Online comment coding cycle scheme



Source: Own Authorship (2021).

As for coding the questionnaires' responses, once the questions had already been built from the analysis categories of the conceptual-theoretical structure, the tabulated answers were also already coded according to the theoretical matrix. Thus, we counted all responses for each question of the two types of answered questionnaires and created charts that contributed to quick visualization and interpretation of responses.

3.6.1.3 Reporting and results analysis process phase

Data coding allowed the identification of several correlations between the cases studied and between categories, in addition to comparing the data collected with the literature and the theoretical framework. According to Aroean, Dousios, and Michaelidou (2019), content analysis is helpful to explore the characteristics of the interaction between actors within the network. Content semantic analysis is useful to unravel how dynamic the interaction is, identifying the most frequent words used in interactions between actors. This form of analysis is useful for understanding the content, tone, and involvement of interactions between actors (Aroean, Dousios, and Michaelidou, 2019). Therefore, at the end of online comment coding and tabulation of questionnaires responses, we produced the final narrative, which consisted of the cross-analysis between the different data sources and comparing the six cases.

At last, this process resulted in the final report of the analysis, describing the interpretation of these correlations. Thus, it was possible to validate and point out changes in the conceptual-theoretical model until arriving at the proposal of a final model of critical success factors. The following chapter concentrates on this main analysis results.

4 RESULTS PRESENTATION AND ANALYSIS

This chapter presents the main results of this research. The presentation of these results is divided into three stages, following the methodological procedures described in Chapter 3: (i) results of inductive content analysis, with the proposition of the conceptual-theoretical structure, (ii) results of conducting the case studies and, (iii) results of the deductive content analysis and proposition of the final model with the critical success factors.

4.1 RESULTS OF INDUCTIVE CONTENT ANALYSIS: CONCEPTUAL-THEORETICAL MODEL

The conduction of the first stage of the case study method, defining a conceptual-theoretical structure, also contributed to achieving two specific objectives: a) Discern the main factors involved in the operation of shared mobility services, and b) Identify the main actants and their interactions in the operation of carsharing services. This was accomplished by inductive content analysis, consisting of a matrix with 2 main themes (context categories), concentrating 5 analysis categories, subdivided into 28 registration units. Therefore, the analysis structure consisted of a conceptual-theoretical model that correlates the main factors that intervene in the operation of shared mobility services (analysis categories: User experience, Service quality from user's perception, and Business models) with the actants and their interactions in the operation of these services (analysis categories: Actants of the shared mobility service network and Interaction between actants in the shared mobility services network).

Table 29 presents the proposition of this theoretical-conceptual model, with the two context categories or main themes, their respective analysis categories, the units analyzed within each category (registration units), and a brief definition from the literature on each unit (context unit). This model was later applied to analyze the data collected on the case studies and achieve the last specific objective.

Table 29 – Conceptual-theoretical model proposition

CONTEXT CATEGORY OR THEME: Shared mobility Service Design		
Analysis category	Registration unit (Aspect to be analyzed)	Context unit (Description of what will be analyzed in this unit)
User experience (Elements that interfere with the user experience, satisfaction, or dissatisfaction, resulting or not in reuse and loyalty, and disclosure by eWoM)	Use experience	Perception of a specific use experience. Improved and pleasing customer experiences are more likely to establish repeat behaviors and, by implication, loyalty. The quality of the experience is measured by how the user chooses to express their perceptions about what was delivered and how it lived up to the original expectations. For example, in the sharing economy context, a carsharing service user may be more likely to use the service again after having a positive experience (Möhlmann, 2015).
	Satisfaction or dissatisfaction	Passengers who experience low satisfaction with poor service can quickly stop using the service (Cheng, Fu, and Vreede, 2018). Overall satisfaction with the service, considering various usage experiences. Satisfaction embodies a range of senses: pleasure, contentment, novelty, and sometimes even relief. The individual passenger assesses the attributes that they consider essential for the performance of the service. Reuse and loyalty are the primary measures of success; however, satisfaction with the experience of a trip does not necessarily indicate that the passenger will be loyal (Coxon, Napper, and Richardson, 2019).
	Customer retention, reuse, and loyalty	A long-term relationship (as opposed to a transition-based relationship) has a significant impact on customer loyalty in the context of PSS (Reim, Parida, and Örtqvist, 2015). Loyalty is fundamental for sharing economy platforms, as their success depends on obtaining and retaining a critical mass of users (Akhmedova, Marimon, and Mas-Machuca, 2020). User loyalty refers to individuals' affective and cognitive commitment to a service and reflects their dedication to the service (Cheng, Fu, and Vreede, 2018). User's intention to reuse the service or assert itself as a loyal user. Many service companies are focusing on customer retention as an important strategic priority, highlighting the key role of understanding customers' intention to repurchase an offer (Hu, 2019).
	eWoM	User actions in recommending and publicizing the service. With loyalty come specific behaviors, such as spreading the positive experience to others by word of mouth , a channel expanded by order of magnitude through social media (Coxon, Napper, and Richardson, 2019).

CONTEXT CATEGORY OR THEME: Shared mobility Service Design		
Analysis category	Registration unit (Aspect to be analyzed)	Context unit (Description of what will be analyzed in this unit)
Service quality from user's perspective (Elements that interfere with the user's perception of service quality)	Access and availability	Shared mobility companies must maintain a high level of system availability , with the station's system running at the time requested by the user, stations system without errors and failures during use, application compatible with the operation of the device system, and user application flawless during use (Maioli, Carvalho, and Medeiros, 2019). Access involves accessibility and ease of use: convenient operation hours and convenient location of the service facility (Parasuraman, Zeithaml, and Berry, 1985; Mont and Plepys, 2003).
	Security and privacy	Security is the freedom from danger, risk, or doubt, comprising physical security, financial security, and confidentiality (Parasuraman, Zeithaml, and Berry, 1985). The degree to which the customer believes that their personal information and privacy are protected (Parasuraman, Zeithaml, and Malhotra, 2005).
	Maintenance and cleaning	Vehicle maintenance and cleaning are elements that interfere not only with satisfaction but also with the user's return to that service (Coxon, Napper, and Richardson, 2019).
	Continuous improvement	User perception of service improvements by the company. Continuous improvement is an antecedent of quality. We witnessed a repeating pattern: companies facilitated feedback from customers and peer service providers and used it to continually improve their services . We call this continuous improvement (Akhmedova, Mas-Machuca, and Marimon, 2020).
	Communication and customer service	Communication means understandably informing customers and listening to them. A company should communicate in different languages to talk to different customer groups, explain what the service comprises, how much various service elements and offers cost, and other service features (Mont and Plepys, 2003). Responsiveness concerns the willingness of employees to provide the service and the speed with which the service is provided (Mont and Plepys, 2003). Responsiveness involves the willingness or readiness of employees to provide service: call the customer quickly, provide immediate service (Parasuraman, Zeithaml, and Berry, 1985) Availability to serve customers and provide prompt service (Parasuraman, Zeithaml, and Berry, 1988). Ability to respond quickly and ability to get help if there is a problem or doubt (Parasuraman, Zeithaml, and Malhotra, 2005).
	Empathy	Perceived empathy represents the extent to which a customer perceives that the service provider values their personal needs and provides them with individualized attention (Parasuraman, Zeithaml, and Berry, 1988). Courtesy comprises politeness, respect, friendliness of service providers (Mont and Plepys, 2003).
	Charges and prices	The extent to which the customer is aware of the price for use and type of vehicle and additional fee charges . Users highlighted the issue of tariffs and surcharges , linking it to the problem of flexibility and parking spaces. (Parasuraman, Zeithaml, and Malhotra, 2005).
	Flexibility	Flexibility in service use by the user for alternative forms of payment, type of vehicle available for use, cancellation policy and chargebacks (Parasuraman, Zeithaml, and Malhotra, 2005).

CONTEXT CATEGORY OR THEME: Sharing Economy Model		
Analysis category	Registration unit (Aspect to be analyzed)	Context unit (Description of what will be analyzed in this unit)
Sharing economy business model (Elements that interfere with service structuring and its functioning over time)	Offer or value proposition	The value proposition corresponds to the service offered to customers (Boons and Lüdeke-Freund, 2013). It's what sets it apart from its competitors. The value proposition provides value through various elements, such as novelty, performance, personalization, design, brand/status, price, cost reduction, risk reduction, accessibility, and convenience/usability (Osterwalder and Pigneur, 2010).
	Operating model	Terrien et al. (2016) show that there are several operational models of carsharing systems , which vary according to the process of picking up and returning vehicles (round-trip, one-way station-based, one-way free-floating) .
	Partner network	Success factors are closely linked to the partnership between the main actors , that is, the ability to develop strategic alliances between actors from all PSS subsystems (Cherubini, Iasevoli, and Michelini, 2015). The platform's success depends on building a critical mass of service providers and customers, as well as on the quality of the service (Kumar, Lahiri, and Dogan, 2018). A company's success depends on the attention that managers pay to the needs and interests of its stakeholders (LACKZO et al., 2019).
	Customer segments	The target audience is a segment of customers to which a company wants to offer value (Osterwalder and Pigneur, 2010), which can be from the business-to-consumer (B2C), business-to-business (B2B), customer-to-customer, or peer-to-peer (P2P).
	Forms of customer relationship	To ensure the survival and success of any business, companies must identify the type of relationship they want to create with their customer segments . Various forms of customer relationship include Personal Assistance, Dedicated Personal Assistance, Self-Service, Automated Services, Communities, Co-creation (Osterwalder and Pigneur, 2010).
	Financial model	The financial model considers costs, benefits, and distribution among stakeholders (Boons and Lüdeke-Freund, 2013). The revenue stream describes how a company earns money through various revenue streams, such as asset sales, usage fees, subscription fees, loans/leasing/rent, licensing, brokerage fees, advertising (Osterwalder and Pigneur, 2010).
	Adaptations to legislation and incentives Or Compliance with legislation	There should be public intervention using multiple policy instruments: incentives, both direct and indirect (Cherubini, Iasevoli, and Michelini, 2015). Governments can play a crucial role in supporting the adoption and diffusion of PSS, developing policy frameworks, and fostering appropriate conditions (Vezzoli et al., 2015). Policy interventions at the local/municipal level aimed at and stimulated more directly the implementation of SPSS solutions than at the national and European level. This is because local authorities are uniquely positioned to identify local needs and can more directly use specific support schemes (Vezzoli et al., 2015).

CONTEXT CATEGORY OR THEME: Sharing Economy Model		
Analysis category	Registration unit (Aspect to be analyzed)	Context unit (Description of what will be analyzed in this unit)
<p>Actants of shared mobility services network</p> <p>(Actors present on the network and their actions)</p>	Users	Users are attracted by the flexibility and convenience of shared mobility services regarding access to limited traffic areas or free parking. In some cases, the services can even replace the car's ownership (Arcidiacono and Pais, 2018).
	Companies and organizations	The organization is redefined as the structure that supports the establishment of the platform in its value proposition: matchmaking. The organization cares about all the people and assets "behind" the platform, such as (micro) entrepreneurs, IT units, investors, legal entities, graphic designers, industrial designers, application developers, and intermediaries. In addition, it must enable the infrastructure necessary to configure a shared work environment (Somers, Dewit, and Baelus, 2018).
	Support companies, suppliers, and manufacturers	Service operators (Chowdhury, 2017). Local maintenance providers that work on vehicle maintenance. The group consisted of maintenance managers and other service technicians. Its task was to provide information to the main actor about failures that occur in vehicles and maintenance activities (Chowdhury, 2017). Energy suppliers, vehicle manufacturers, battery manufacturers, charging terminal manufacturers, IT developers (Couzineau-Zegwaard and Meier, 2018). The jockeys responsible for distributing vehicles to different pick-up and parking locations in response to demand and for their maintenance (LESTEVEN; LEURENT, 2016).
	Infrastructure and ecosystem (non-human actors)	Technical objects (cars, batteries, charging terminals, telecommunications infrastructure) play an important role (Couzineau-Zegwaard and Meier, 2018). The ecosystem is redefined as the bigger picture of all consumers and suppliers within the system. It manifests itself on the platform, which supports the social network. This platform bridges the gap between the organization behind the concept and the users involved (Somers, Dewit, and Baelus 2018).
	Government and local authorities	Municipalities regulate the establishment and operation of urban sharing initiatives through a range of regulatory mechanisms (e.g., laws, taxes, prohibitions, and policies). In addition, they provide financial and infrastructure support to urban sharing organizations and act as facilitators , promoting collaboration between urban sharing organizations or creating partnerships with municipal actors to allow sharing to happen (HOFFMAN et al., 2019). Governments can play a crucial role in supporting the adoption and spread of PSS, developing policy frameworks and fostering the right conditions (Vezzoli et al., 2015).
	Citizens (society)	The level of society is defined as the highest image where PSS operate. In fact, carsharing is not just a matter of business or fleet optimization, but it creates a complex system made by different actors, including citizens , public authorities and municipalities, companies. The system is made complex by the strong links between the actors, as well as the implications for the governance of a city when a large carsharing service is introduced, such as the integration with the existing public transport network and the leasing policies of different companies competing in the same urban area (Ferrero et al., 2018).

CONTEXT CATEGORY OR THEME: Sharing Economy Model		
Analysis category	Registration unit (Aspect to be analyzed)	Context unit (Description of what will be analyzed in this unit)
Interaction between actants in shared mobility services network (Analysis of the relationship dynamics between actors, from the user's perspective)	Trust and reliability	<p>Trust involves establishing trust in the network of actors (Chowdhury, 2017).</p> <p>It involves both the trust that the customer has in the company that provides the service (trust based on the institution), regarding the correct operation and adequate charging, and the trust in other users (willingness to trust people), trusting that they will use it correctly (LIANG; CHOI; JOPPE, 2018).</p> <p>The assurance and trust that the customer feels when dealing with the service is due to its reputation, as well as to the information presented in a clear and true way (Parasuraman, Zeithaml, and Malhotra, 2005).</p>
	Value co-creation	<p>The addition of value in many industries occurs through co-creation by a constellation of actors, such as suppliers, business partners, customers, community and even competitors (Cherubini, Iasevoli, and Michelini, 2015). Co-creation only occurs when two or more parties influence each other or, using the terminology of service marketing, interact (GONROSS, 2013). Co-creation is a process in which a high level of participation and collaboration with companies is required from customers to customize and innovate new products and services (HAMIDI, 2020).</p> <p>Service providers maintain cooperative relationships with the service platform and customers to provide better services and ensure quality of service. Thus, for the highest quality services to be provided, it is essential that the three actors maintain a positive relationship with each other and a state of balance (LI, 2019).</p>
	Value co-destruction	<p>The value co-destruction is present when the interaction between the customer and the company (customer service department staff) was not successful (Sthapit and Björk, 2019).</p> <p>Value co-destruction is defined as an interaction process between service systems that results in a decline in at least one of the welfare systems. Typically, this decline is due to a service system's misuse of its own or another system's resources, either accidentally or intentionally. This directly or indirectly leads to financial and reputation loss for companies and can also directly or indirectly harm users and non-users (Yin, Qian, and Shen, 2019).</p>

Source: Own Authorship (2021).

After the proposition of this conceptual-theoretical model, we compared and analyzed the data collected by netnography and questionnaires, referring to the six case studies. We took several notes during the reading, recording the perceptions about each case from the collected data and observations about the actors and their interactions in the network. The following section presents a summary of the cases studied.

4.2 CASE STUDY REPORTS (INDIVIDUAL CASES)

This section presents a synthesis of the six case studies, with a brief historical report and details of how each one works, and a description of the partnerships of carsharing services with the city halls that answered the questionnaire. These descriptions serve to assist in further deepening the subsequent analysis.

4.2.1 Case A

Company A was founded in 2008 in Germany as a carsharing service from a vehicle manufacturer. The service only offered two-seat compact vehicles in combustion or electric versions. As operating modalities, it provided both one-way and round-trip models. Rates were per minute, with hourly or daily usage discounts, including rent, fuel, insurance, parking in authorized areas, and maintenance. In addition, the company offered promotions during the launch period without charging the annual fee, which started to be charged to new users later. As to parking, the company provided exclusive or common spaces with special permission from the municipality where it operated.

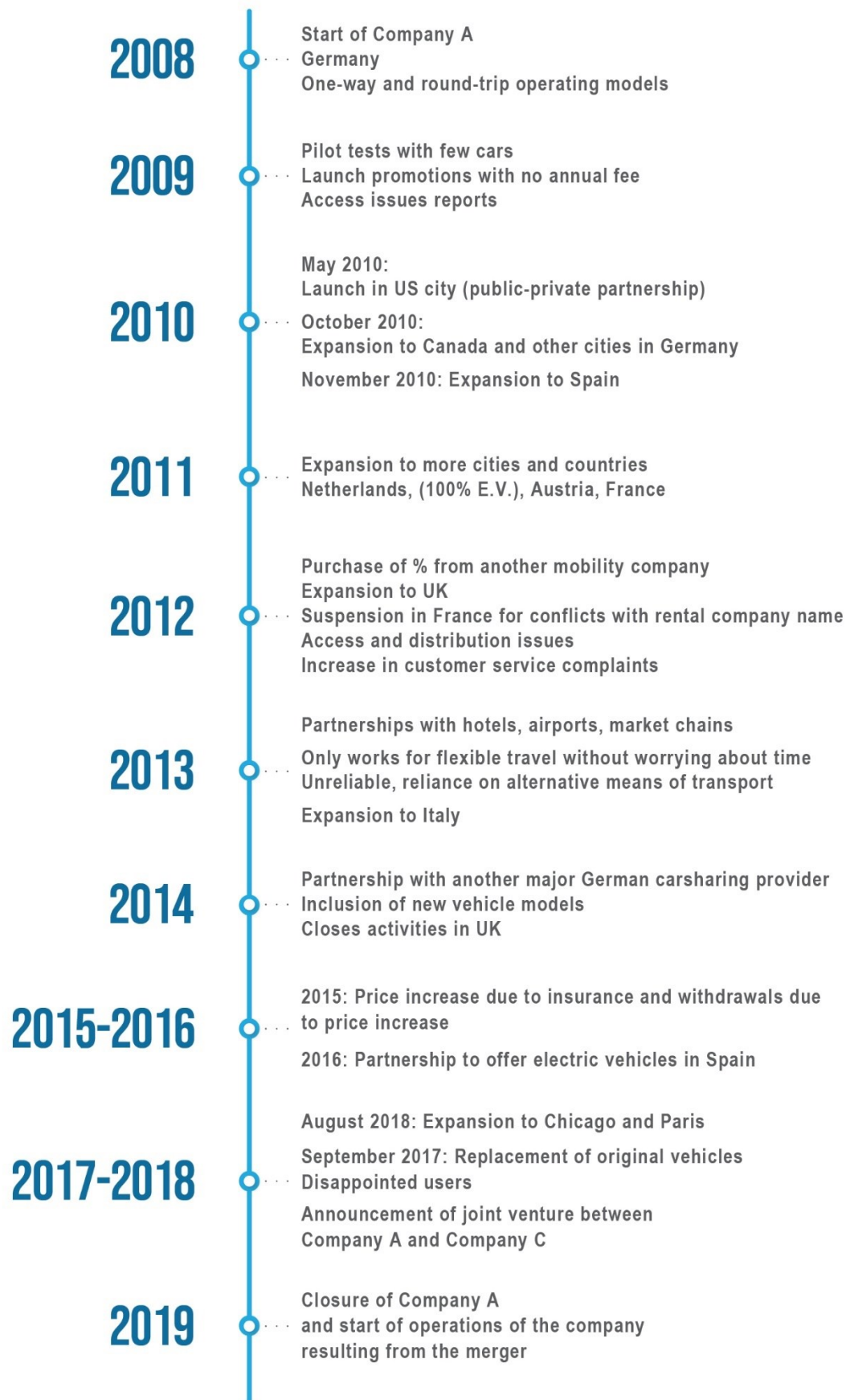
In 2009 company A started several pilot tests with few cars in operation, in which several access problems were reported. In 2010 company A began its expansion to several cities in Germany, Vancouver in Canada, and several cities in the United States: Austin, San Diego, Portland, and Washington, in which it formed

public-private partnerships. From 2010 to 2016, the service expanded to other European countries, such as Spain, Netherlands, Austria, England, and Italy. In France, it started operating in Lyon by forming a partnership with a French rental company. However, in 2012 this partnership was suspended due to conflicts with the operator's name, and in 2014 the company ended its activities in the United Kingdom.

In 2012, company A acquired part of another company already serving as a provider of various mobility services. As of 2013, it established partnerships with several local businesses, such as hotels, airports, and market chains. In 2014, company A collaborated with another carsharing service provider in Germany and started to offer more vehicle models. In 2016, it began another partnership with a Spanish company to offer electric vehicles in this country.

Since 2012, users of company A started to complain about problems accessing the service and issues with customer service. In 2015, company A readjusted prices due to changes in the insurance, generating several dropouts due to charges increase. As of 2017, company A started to replace its vehicles, which disappointed many users, as they did not want to pay more for luxury models. They just wanted to drive a compact and practical car to get around the city. In 2018, the merger between company A and company C, which belonged to another German automaker, was announced, giving rise to a joint venture providing carsharing services. In 2019, company A definitively ended its activities to start operations of the new company. Figure 25 illustrates a brief timeline of company A's history.

Figure 25 – Case A timeline



Source: Own Authorship (2021).

4.2.2 Case B

Case B originates in Canada. Founded in 1994, it started its operations with the round-trip operating model. In 2010, company B entered a partnership with a local railway operator to offer members discounts when using both modes. As of 2010, company B implemented an application to use vehicles that were previously accessed through a physical card, providing new stations and more flexible rules for canceling reservations due to blizzards. In 2012, company B included more models of electric vehicles, which were considered significant differentials and attractiveness of the service by users. In addition, the company started to offer a maintenance service for electric cars for the general public. In 2012, Case B also acquired a French carsharing company and expanded its operations to Paris.

In 2013, company B started a one-way pilot test in a Canadian city, which was later definitively implemented. Since 2013, company B has created several partnerships with other modes of transport to allow greater integration in their joint use, such as the proposal of a single card to access cars and public transportation or an application that enables planning trips by integrating the carsharing and public transport, and a partnership with a bike-sharing company. In 2016 and 2017, company B entered a partnership with another carsharing company to expand its operations in eastern Canada. Furthermore, it partnered with a French manufacturer to make more vehicle models available and develop to other east European countries.

Since 2015, complaints from users about bureaucracy to use a vehicle have been verified, in addition to considering that technology is not company B's strong point. As of 2017, complaints have increased about communication and customer service problems, access and availability of vehicles, and reports of issues with batteries in electric cars in winter.

In 2018, case B expanded further and launched an option that encourages users to use more distant cars to bring them to more central sectors of cities. The company is still in operation, and in 2020 it was considered an essential service due to its safe use for shopping trips or emergencies. Figure 26 shows a timeline with company B's trajectory.

Figure 26 – Case B timeline



Source: Own Authorship (2021).

4.2.3 Case C

Case C was implemented in 2011 in Germany as the carsharing service of a German automaker. Operations began with the round-trip model. The service had a great attraction for providing the experience of driving electric models, with many requests to increase the area of operation and increase the number of cars available. In addition, company C offered a bonus to users who returned electric vehicles and recharged at the stations, earning extra minutes for future use.

Company C was present on Twitter since 2015, receiving constant improvements suggestions from users. In addition, the company's CEO often replied to users' tweets through his account. Since 2015, company C presented user complaints related to access, application use, excessive charges, and lack of reliability. Another issue was the payment made only for packages and subscriptions, without a more flexible charging option. As of 2016, there was an increase in complaints about the lack of vehicles in strategic locations, such as airports, and the delay in approving the registration that allows service use, which took about three days.

Company C expanded to some cities in other countries during its operation period, such as Belgium in July 2016 and Portugal in August 2017. In December 2016, negotiations began to merge with the carsharing of another German automaker. Between 2018 and 2019, the two companies A and C worked together, but company C had more complaints. Reports of problems began to increase more and more, with complaints related to dirt and cleanliness of vehicles, cars parked in prohibited places, and many issues accessing and using the app. In 2019, the joint venture was finally announced, and company C gradually ended its activities. Figure 27 presents a brief timeline of company C's history.

Figure 27 – Case C timeline



Source: Own Authorship (2021).

4.2.4 Case D

Company D was founded in 2001 in Germany. The company provides the carsharing service of the German logistics company and started its operations in the round-trip model.

In 2009, it expanded to more cities and partnered with car rental companies to supply cars. In December 2014, it migrated to the free-floating model. In 2015, company D started working in cooperation with company A, which caused many customers who were thinking of giving up continuing with the service because of this partnership.

Since 2011, users on Twitter have reported frequent problems with access instability and server crash, interfering with the use of the application and access to company D's website. In addition, users made many requests to expand to other cities in Germany, but in 2016, the company began to close some operating locations, stating that they were little used. In 2019, company D said that it would like to offer the service across the country, if possible, but its offer is based on demand, and some locations were not economically viable, so it is not present in all regions of the country.

In 2018, company D implemented penalties for incorrect parking. In January 2020, most users reported they were satisfied with the service but considered it expensive and said they would use it more if the prices were lower. In February 2020, there was an increase in prices and a reduction in the number of operating locations for economic reasons, in addition to greater concern with vehicle hygiene and disinfection. Figure 28 illustrates this brief history of company D on a timeline.

Figure 28 – Case D timeline



Source: Own Authorship (2021).

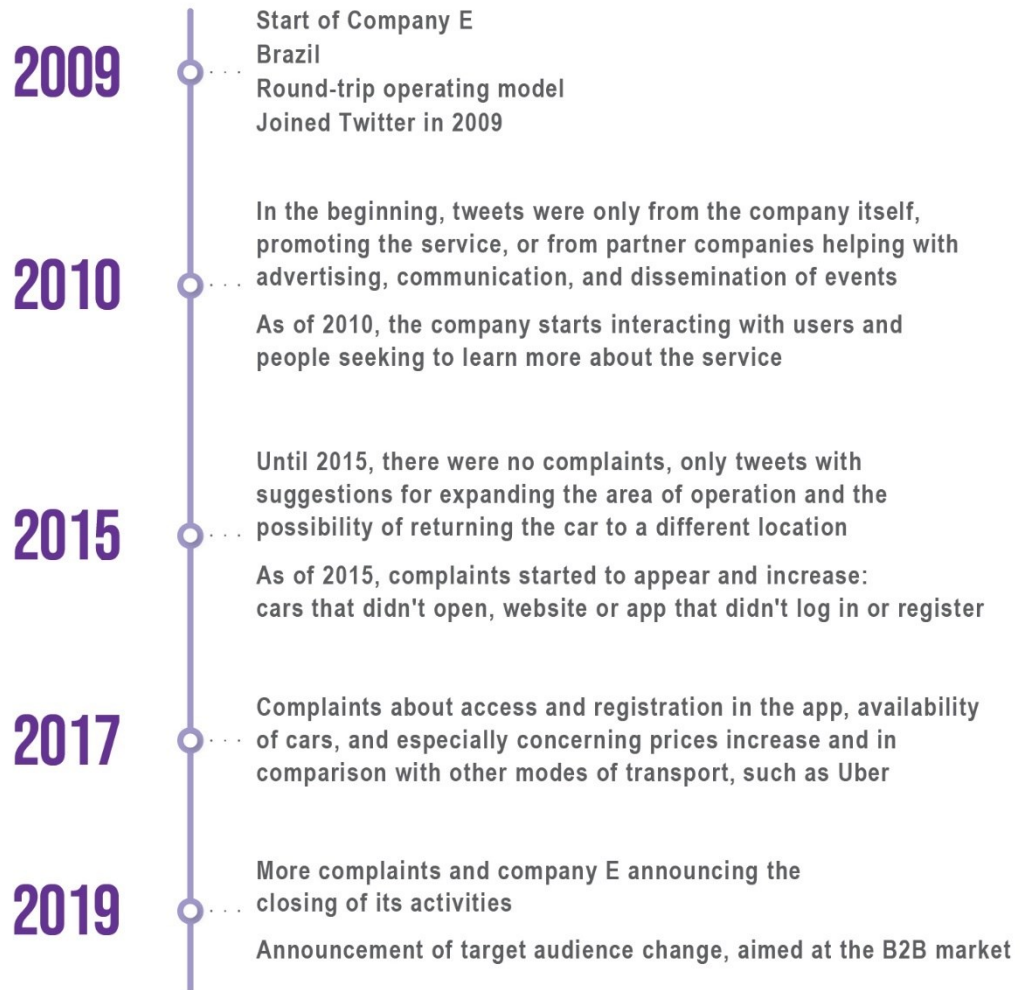
4.2.5 Case E

Case E is from a Brazilian startup inaugurated in 2009, operating with the round-trip model. The company established partnerships with private parking lots, where users removed and returned the vehicles, which were compact models of a French manufacturer's car. The service was charged per minute of use and distance covered, in addition to packages for daily use or weekends and holidays.

Company E joined Twitter in 2009, and in the beginning, its publications were only from the company itself, promoting the service, or from partner companies that shared advertising and events. Later, as of 2010, company E began a more significant interaction with users. Before 2015, company E received several suggestions from its consumers, such as expanding the area of operation or the possibility of migrating to the one-way and free-floating model, which would allow customers to return the car to a different location from the pick-up point.

As of 2015, several complaints began to arise about the use of the service, with reports of problems with unlocking vehicles, website or application that were constantly down, or problems with registration and login. In 2017, these complaints also started to include the lack of available cars and rising prices. In this aspect, users began to point out the impossibility of using the service compared with other modes, such as ride-hailing services or even conventional car rental companies.

At the end of 2019, company E announced the end of its activities as a carsharing operator in providing B2C services, indicating its shift in focus to supplying technology to the B2B market. Figure 29 summarizes company E's trajectory on a timeline.

Figure 29 – Case E timeline

Source: Own Authorship (2021).

4.2.6 Case F

Case F is an American carsharing company, a subsidiary of a group of rental companies. The company, which began as a startup, was founded in 2000, operating with the round-trip model. Cars are reserved on-demand, hourly or daily, and fuel, insurance, and maintenance costs are already covered in the amount paid, in addition to having dedicated parking spaces on public roads. The company works with monthly or annual subscription systems, and additional fees may be charged in case of delays in returning the vehicle to the following user. Company F offers several options among the available cars, with compact cars, luxury cars, and even SUVs and vans, including combustion, hybrid, and electric vehicles in the fleet.

In 2007, company F joined with a competitor and the second largest carsharing company in the US to create a car rental company with operations throughout the country (Acquier, Carbone, and Massé, 2019; Gates, 2007). In 2009, it started its global expansion acquiring carsharing companies from other countries, such as Spain. As of 2011, it started partnerships with different operating locations, such as airports, markets, cafes, and universities, also expanding to the business market (B2B). In addition to operating in numerous cities in the United States, company F has expanded its activities to cities in Canada, Costa Rica, Iceland, Taiwan, Turkey, and the United Kingdom.

In 2013, company F was purchased by a large group responsible for the traditional vehicle rental and leasing companies (Lagadic, Verloes, and Louvet, 2019). With this acquisition, company F became the largest carsharing operator in North America (Stocker and Shaheen, 2017). In 2013, the company tested the one-way model, but it was suspended in 2018. Over the time that company F has already been in operation, there has been an increase in user complaints, mainly related to customer service. Loyal customers started to quit service F due to dissatisfaction and constant price increases, charges for additional registration fees, annual fees, and reservations, in addition to costs for delays and fines. Collected tweets also pointed to recurring problems with the connection to the server being down, with the application and website down. In 2020, company F reduced its operation area in Canada, and complaints about issues with customer service became more and more recurrent. As they could not contact the company in any available channels, some users even suspected that it had ended its activities. In 2020, however, company F announced the expansion of its customer service team (Mcfarland, 2020) to meet this demand and alleviate these problems. Figure 30 presents a brief timeline for company F.

Figure 30 – Case F timeline

Source: Own Authorship (2021).

After this historical description of the six carsharing companies studied, next, we describe the partnerships between the carsharing services and the city halls of the Brazilian capitals that answered the questionnaire.

4.2.7 Case Reports of Partnerships with Brazilian Capital Cities

Of the eight Brazilian city halls we identified and sent the questionnaires, four sent their answers: Fortaleza City Hall (Ceará), Recife City Hall (Pernambuco), Belo Horizonte City Hall (Minas Gerais), and Curitiba City Hall (Paraná). The following subsections describe the projects and details of partnerships with carsharing services in each city.

4.2.7.1 Fortaleza City Hall

In 2016, the city of Fortaleza inaugurated an electric carsharing network integrated with other modes of urban public transport. The VAMO service is a public-private partnership coordinated by the Municipal Secretariat for Conservation and Public Services (SCSP) through the Transport and Traffic Immediate Action Plan (PAITT). The service is sponsored by the company Hapvida Saúde, selected in a public bidding process, and the company Serttel is responsible for the vehicles' implementation, operation, and maintenance (VAMO, 2021).

One of the main incentives granted by the city hall is the permission for the operator to enter with a sponsor to facilitate financial balance. In addition, the VAMO carsharing system has exclusive parking at stations distributed throughout the city, free of charge. Furthermore, discounts are given to users who have a single public transport ticket to encourage joint use with other modes.

4.2.7.2 Recife City Hall

In 2015, Recife inaugurated an electric carsharing system through the Secretariat of Economic Development, Science, Technology, and Innovation (SDECTI). Installed in Porto Digital, a Technology Park downtown, the company responsible for operating the system receives economic incentives enjoying tax benefits. The city considers the technological park area an experimental laboratory for innovative and sustainable technologies, and carsharing is seen as a strategic action for the neighborhood's qualification.

In 2016, through a partnership with the city of Recife, Porto Digital offered the population of Recife a free month of service, allowing citizens to register for a specific period and use shared electric cars with exemption from both subscription and the fee charged per trip. This initiative was launched to increase the familiarity and knowledge of the local population about the system (PORTO DIGITAL, 2016).

Fees for using the service include a monthly subscription and cost per journey and time. However, the system was also designed to encourage solidary carpooling, and if users signal that they are willing to offer a ride, the cost of the trip is reduced by half (PORTO DIGITAL, 2015). Among the other advantages and benefits, the system seeks to avoid the need to purchase and maintain a private vehicle, and to reduce the environmental impact, both in shared use and in reducing emissions, in addition to encouraging adherence to other modes, such as public transport, bicycles, and hiking.

4.2.7.3 Curitiba City Hall

In Curitiba, the capital of Paraná State, the public agency that answered the questionnaire was the Institute for Research and Urban Planning (IPPUC). The proposal is to implement a carsharing service in partnership with the automaker Renault, which has a factory unit already installed in Paraná. The planning and possible partnerships are still at an initial stage of negotiations, with the preparation

of the legal framework and joint studies for formatting the solution to be implemented in the form of a public-private partnership.

Among the initiatives under discussion are the use of electric vehicles in this carsharing network and the exemption from Regulated Parking (EstaR) payment fees in the city. Since 2019, the capital has already had this parking exemption for 100% electric cars circulating on public roads, valid for private vehicles, and extended to shared-use electric cars. The automaker's projection is to put into operation 500 vehicles in the carsharing model by 2025.

4.2.7.4 Belo Horizonte City Hall

To verify the existence of partnerships in Belo Horizonte, we contacted the city hall through the Transport and Transit Company of BH – BHTRANS, the public agency that responded to the questionnaire.

We found carsharing services in operation in Belo Horizonte since 2016. However, despite negotiations for the evaluation of the city hall and feasibility studies for this system, the city informed in its answer to the questionnaire that there are no BHTRANS partnerships to operate carsharing services in Belo Horizonte, nor actions that promote public-private partnerships. Thus, the carsharing services operating in the city are private, without partnerships with the city.

After this summary of each of the cases studied, the following section presents the results of the deductive content analysis. The process consisted of comparing and analyzing all data collected on the cases from the proposed conceptual-theoretical model. This analysis contributed to validating the theoretical model and proposition of the final model of critical success factors.

4.3 RESULTS OF DEDUCTIVE CONTENT ANALYSIS

To meet the third specific objective, we correlated the analyzed data collected on the cases of continuity and interruption of carsharing services based on

the factors and actants defined in the conceptual-theoretical model. As described in section 3.6, we coded the online data from Twitter and Yelp from the analysis categories and registration units proposed in the conceptual-theoretical model and the research protocol. We coded 8,195 tweets and reviews in the five categories and respective registration units at the end of this stage. During this stage, we also reorganized some of the initially proposed registration units into the following analysis categories:

- a) Analysis Category – Service quality from user’s perspective:**
- i. We combined the Empathy and Communication and Customer Service registration units in the same unit.
 - ii. We created a new registration unit from the Access and Availability registration unit: Operation and coverage area.
- b) Analysis Category – Sharing economy business model:**
- i. During coding, we created new registration units such as Acquisitions by or from other companies and relationships with different transport modes. However, we realized that all these units were related to the Partners Network registration unit during the reading and analysis stage, so we only kept this registration unit in the final analysis description.
 - ii. For the three continuity cases still in operation, we also coded some issues related to the companies' adaptations to the new global scenario of 2020, referring to the COVID-19 pandemic. However, considering that they were only for the most recent data, perceived as of March 2020, we decided that there was no need to create a new specific registration unit due to the small amount of data for the analysis of this aspect.

Table 30 shows the total distribution of the 8,195 comments at the end of the deductive content analysis coding process, in the five analysis categories and 28 registration units, according to the six cases studied.

Table 30 – Distribution of coding by cases, categories, and units of the theoretical model

Categories and units	Case A	Case B	Case C	Case D	Case E	Case F	TOTAL
1 User experience							
1.1 Use experience							287
Positive experience	52	12	36	8	15	67	190
Negative experience	17	0	25	5	2	48	97
1.2 Satisfaction or dissatisfaction							715
Satisfaction	25	15	13	6	18	131	208
Dissatisfaction	76	50	42	13	8	318	507
1.3 Customer retention							149
Loyalty	31	20	23	7	14	45	140
Dropouts	2	1	2	0	1	3	9
1.4 eWoM							282
Positive eWoM	50	32	29	28	37	89	265
Negative eWoM	3	0	0	2	1	11	17
2 Service quality from user's perspective							
2.1 Access and availability							517
Compliments	3	2	0	0	1	4	10
Complaints	124	38	129	32	20	164	507
2.2 Security and privacy							52
Complaints	9	3	14	6	0	20	52
2.3 Maintenance and cleaning							102
Compliments	0	2	3	3	0	3	11
Complaints	5	16	32	8	2	28	91
2.4 Continuous improvement							45
Compliments and suggestions	6	4	8	5	4	8	35
Complaints	1	3	6	0	0	0	10
2.5 Communication and customer service							609
Compliments	17	4	11	9	0	70	111
Complaints	74	40	73	18	17	276	498
2.6 Operation and coverage area							290
Compliments	29	2	7	3	0	11	52
Expansion requests	47	4	26	4	6	20	107
Complaints	26	24	40	14	3	24	131
2.7 Charges and prices							208
Compliments and discounts	3	2	3	10	2	1	21
Complaints	29	9	45	23	16	65	187
2.8 Flexibility							91
Compliments	11	9	10	4	0	14	48
Complaints	3	4	15	18	3	0	43

Categories and units	Case A	Case B	Case C	Case D	Case E	Case F	TOTAL
3 Business model							
3.1 Offer or value proposition	10	18	9	4	3	8	52
3.2 Operating model	14	27	21	25	6	31	124
3.3 Financial model	6	10	19	24	1	26	86
3.4 Customer segments	0	0	2	1	0	3	6
3.5 Customer relationship	7	2	15	15	0	17	56
3.6 Partner network	23	27	30	19	2	10	111
Acquisitions	17	5	0	0	0	20	42
Other transport modes	8	8	0	0	0	10	26
3.7 Compliance with legislation	14	26	16	0	0	5	61
3.8 Adaptations to COVID-19	0	19	0	1	0	7	27
4 Actants of shared mobility services network							
4.1 Users	0	0	0	1	0	1	2
4.2 Carsharing companies	9	0	0	4	0	1	14
4.3 Support companies	1	8	6	4	0	1	20
Manufacturers	1	1	4	10	0	6	22
Advertising	0	2	8	2	14	3	29
Other carsharing companies	19	7	3	0	2	15	46
4.4 Infrastructure	6	3	17	0	0	17	43
4.5 Government and authorities	0	2	15	0	0	0	17
4.6 Citizens	3	2	8	1	0	1	15
5 Interaction between actants in shared mobility services network							
5.1 Trust and reliability							82
Trust – compliments	1	0	0	1	0	0	2
Trust – complaints	5	1	18	7	4	45	80
5.2 Value co-creation							60
Users' suggestions	3	10	15	5	5	8	46
Companies' response and interaction	0	2	2	2	2	6	14
5.3 Value co-destruction							209
Incorrect parking and vehicle damage	7	2	63	7	0	8	87
Cleaning complaints	7	6	5	2	0	12	32
Complaints, fees, and fines	9	0	12	0	0	2	23
TOTAL CODINGS							8.195

Source: Own Authorship (2021).

The following subsections present a description and interpretation of the cross-analysis between the different data sources and the comparison of the six cases among themselves, according to the analysis categories and their respective registration units.

4.3.1 Analysis Category of User Experience

The first analysis category we established was of User Experience. This topic comprises questions about the specific usage experience, general satisfaction or dissatisfaction, customer retention, reuse, loyalty, and the disclosure by electronic Word of Mouth (eWoM). Each related registration unit is analyzed as identified in the cases, based on data collected from the perspective of users and companies.

4.3.1.1 Use experience

This registration unit aimed to verify users' perceptions about their experiences after using the service (Möhlmann, 2015; Parasuraman, Zeithaml, and Berry, 1988), which may have been positive or negative, in addition to verifying the actions of the companies to monitor this aspect.

From the users' point of view, we identified the use experience from the comments collected on Twitter and Yelp, which indicated positive or negative usage situations. In many cases, users themselves use the word experience to describe the specific situation. For positive experiences, we observed expressions such as fantastic, excellent, and great, as well as positive comments related to the use of electric cars or models different from those the user knows, as in the examples:

Had my first @caseF driving experience today! It was delightful!
(Tweet from December 29, 2017)

Spectacular service from @E. User experience score 10 on all interactions.
(Tweet from June 4, 2019).

No train for 40 min so decided to take a @C. Great experience!
(Tweet from July 14, 2019).

We also identified positive experience descriptions linked to loyalty and reuse intention (Li et al., 2019; Möhlmann, 2015):

I just had my first @F experience and it could not have been better! Overall, clean, well kept, easy. I am a F converter! (Yelp review from January 2, 2011).

Pretty good service from @F. I was pretty happy with this experience. I will use it again when I need to. (Yelp review from January 2, 2011).

In the negative experience comments, we identified the use of expressions such as terrible, horrible, disappointing, worst experience ever, in addition to complaints about poor usability and poor user experience, as in:

@A horrible experience, my account has an outstanding amount of \$2 as my credit card was stolen and had to change it. I have been trying to reactivate my account, calling them several times without any answer! Such a horrible business model and customer service! (Tweet from August 30, 2019).

Horrible first rental experience. I'm still waiting for a car 55 minutes after my reservation time. (Tweet from October 28, 2012).

@A your app is broken it crashes every time I use it and also logs me out me as soon as I try to get a car really bad first experience :/ (Tweet from July 4, 2016).

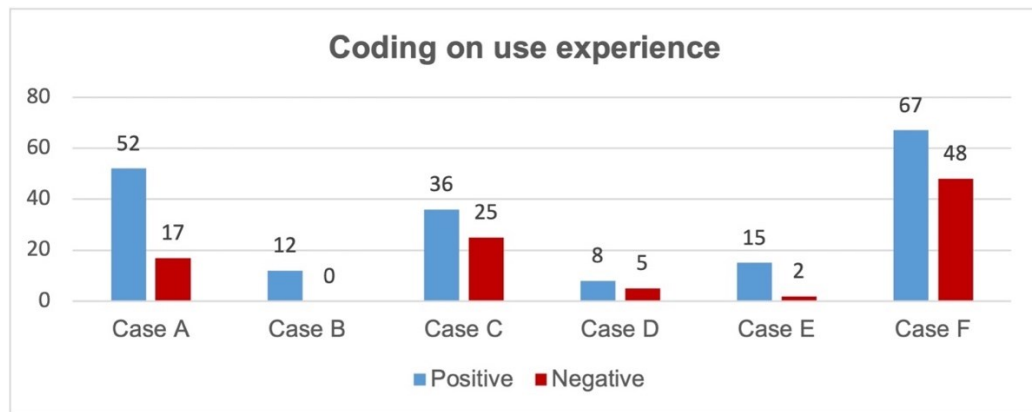
Unlike the positive comments, in the negative experiences, some users showed feelings of dissatisfaction and the intention of not using the service again (Parasuraman, Zeithaml, and Berry, 1988):

First experience with @F is not going well. This may be our one and only time using it. (Tweet from April 29, 2012).

I now am officially disappointed with my first @F experience. I never even got to pick up the vehicle I needed. Goodbye useless car sharing experience!!!! (Yelp review from September 8, 2018).

To help analyze all cases comparatively, Chart 3 shows the 287 comments coded in this registration unit separated by the respective case study and counted in positive (total of 190) and negative (total of 97) experiences. It is noteworthy that case F has a greater number of comments because it has been in operation for a more extended period and has been mentioned on the Twitter platform since 2007, while most other cases only started to interact from 2012 onwards.

Chart 3 – Distribution of coding on use experience

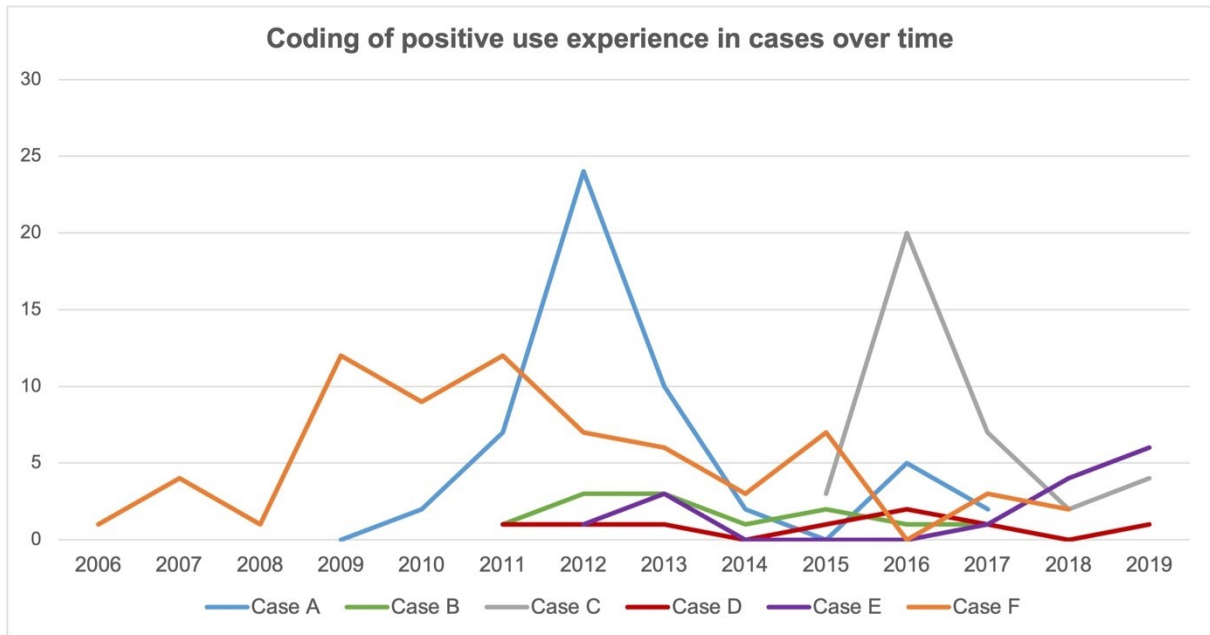


Source: Own Authorship (2021).

All cases, both from continuity and interruption, had more positive than negative experiences comments, suggesting that this sole factor does not determine the company's success but can contribute to the reuse and loyalty of customers, confirming the ideas of Möhlmann (2015). Besides, practically all cases had negative reports, revealing that issues and bad usage situations can happen, but they shouldn't overcome the positive situations. In some comments, it appears that an isolated negative experience did not necessarily result in the user quitting the service, as the user is often willing to test it again. However, if they continue to have negative experiences in the same usage aspect or others, their trust in the service drops, increasing the chances of dissatisfaction. Therefore, it is important to verify what the company does to minimize these issues in its interaction and touchpoints, contributing to the precepts of Coxon, Napper, and Richardson (2019).

Considering the companies posture regarding this registration unit, we found that most interact with users and respond to their posts on social media. By observing the publications over time, we noticed that companies B, C, D, E, and F interacted with their users and sought to answer most of the reports, both from good and bad experiences. Only company A did not demonstrate interaction with users, nor did it seem to be aware of its positive or negative comments on Twitter. Thus, despite negative usage experiences, we understand that what matters is how the company deals with these reports and proposes to resolve them.

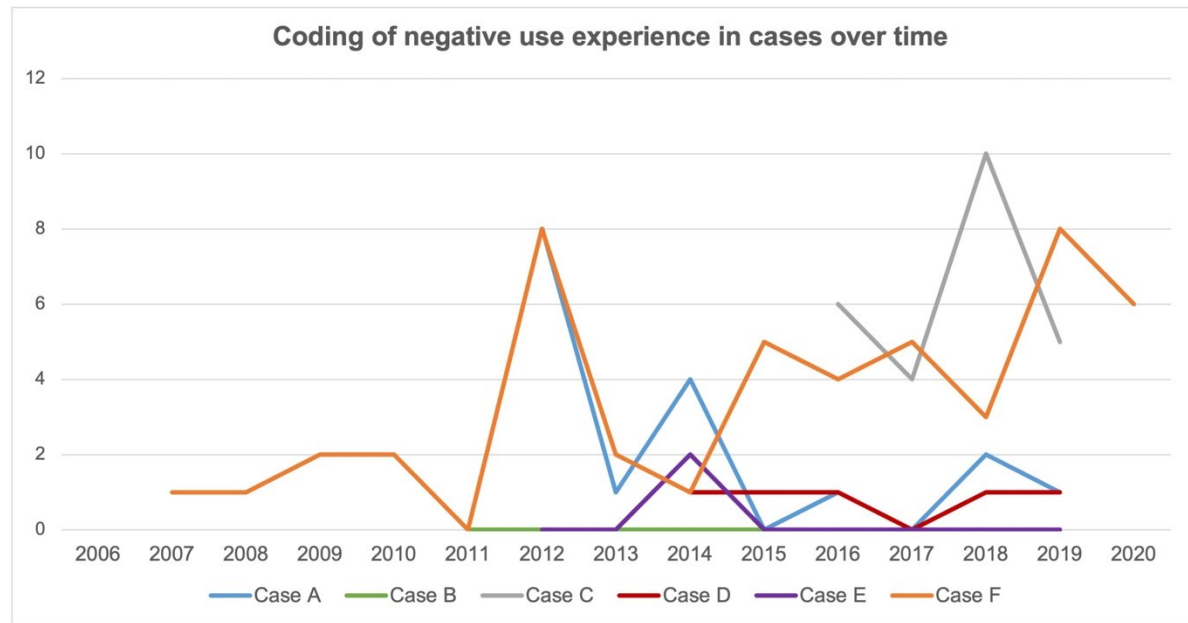
We also carried a temporal analysis of these posts' distribution over each company's operation years, separated by positive and negative experiences (Charts 4 and 5, respectively).

Chart 4 – Coding of positive use experiences in cases over time

Source: Own Authorship (2021).

Considering the companies that had their activities closed, such as A and C, we noticed a peak in the reporting of positive experiences, which drastically drops soon after as the closing year approaches. Despite also having closed its activities, Company E showed a peak of compliments just after announcing its closure. At that time, users commented on their sadness with the closure and reported how much good experiences they had during the operation time and service use.

Regarding the companies that are still in operation, cases B and D have a similar history, with ups and downs, but maintain an uninterrupted comments line. Company F appears to have a peak positive experience comments between 2009 to 2011. After this period the number of reports is smaller, with some fluctuations, but no longer reaching the previous peak. In case F, it is interesting to compare this result with the variation of negative experience reports over time, as shown in Chart 5.

Chart 5 – Coding of negative use experiences in cases over time

Source: Own Authorship (2021).

Therefore, we can observe that case F had an increasing number of negative experience reports, with peaks in 2012 and 2019, but with an upward trend, while positive comments had a downward trend in recent years. Despite this, the company continues to operate its carsharing service and overall had more positive reports than negative ones. Considering the other continuity cases, company B had no complaints about negative experiences, and case D had an almost constant level. As for cases of interruption (A, C, E), there is a certain pattern, in which there is a peak of negative experiences that drops as the company approaches the year ending its activities.

Thus, we indicate that for carsharing service companies, the analysis of their customers' usage experiences helps identify specific usage situations and why the experience was positive or negative, enabling the monitoring of what can be improved in service. Furthermore, the posts analyzed showed that the bad experience is usually linked to a specific aspect, such as the vehicle's delay, excessive charges, or problems in activating the account. Thereby, one way to improve user experience is to identify which touchpoints have the most negative reports and then adjust and improve them, a perception in line with Bitner, Ostrom, and Morgan (2008). In addition, service Design tools, such as the service blueprint and customer journey map (Moritz, 2005), can help to map these points and outline change proposals.

Finally, the experience of using a service is also linked to the consistency and integration of the entire network of stakeholders involved in delivering the service, as mentioned by Ostrom et al. (2015). The positive or negative experiences have a relationship between the user and the vehicle maintenance and distribution actors, with the actors responsible for developing and updating the application and website and the users themselves, who must return the vehicles within the estimated time for others to use. Thus, corroborating Zhang, Jahromi, and Kizildag (2018), in addition to identifying only the touchpoints in the relationship between provider and user, it is essential to monitor customer interactions with all stakeholders of the solution-demand network, as all these interactions can interfere with the overall satisfaction.

4.3.1.2 Satisfaction and dissatisfaction

This unit aimed to verify the general level of satisfaction and dissatisfaction of users with the services. It comprised the evaluation of a set of experiences (LIANG; CHOI; JOPPE, 2018) and the result of the assessment that users make of these experiences, in a comparison of what they expected to receive before using the service (expectation) with the perceived value after use (Gallarza, Gil-Saura, and Holbrook, 2011; Yamada, 2019). It also aimed to identify the actions of companies on this aspect.

From the users' point of view, we identified satisfaction from the comments collected from Twitter and Yelp and from the responses to the questionnaire, which indicated satisfaction or dissatisfaction with the service's general use. In the social media posts, we sought the indication of regular and continuous service use and not just mentions of an isolated use experience. This action also demonstrates the relationship of satisfaction with the intention to service reuse (LIANG; CHOI; JOPPE, 2018) and loyalty (Cheng, Fu, and Vreede, 2018; Hu, 2019).

In the satisfaction comments, we observed the use of expressions such as happy, satisfied, pleased, liked, or loved the service, as in the examples:

@A is everywhere in Vancouver. It's great. Just wish more of them were electric. (Tweet from May 06, 2013).

@A all resolved! You folks rule, love this service so much <3 (Tweet from November 27, 2015).

Seriously, I live in NYC, and have no need for a car. Whenever I do, I just rent a @F, and I'm a happy camper! (Tweet from March 26, 2010).

In the comments of dissatisfaction, we noticed terms such as disappointed, unhappy, nothing works, or I hate the company. We also observed that dissatisfaction arises over time, and not just because of one bad user experience.

I am really disappointed with company @B. The business concept is such a good idea in theory but the billing system is just cruel. (Yelp review from June 21, 2018).

Every time I take @B I regret it because it takes longer to find parking than it does to get to my destination. (Tweet from March 04, 2020).

Some of the reports show that dissatisfaction is related to a series of events, as in the expression "it was not the first time," and also with users stating that they have given up using the service, as in the phrase "I will not return or use it again."

Awful service. Every car I book seems to have something wrong with (broken windshield, smell like smoke, garbage inside.) They are constantly changing the cars I book on me to less convenient options so even if you book ahead to get a car you want in a good area they can change it without warning. I've tried to call customer service and have been on hold for 30+ minutes before hanging up. I wrote them an email and it took one month to respond. Not to mention it's overpriced. I can't wait to cancel this service. (Yelp review from July 20, 2020).

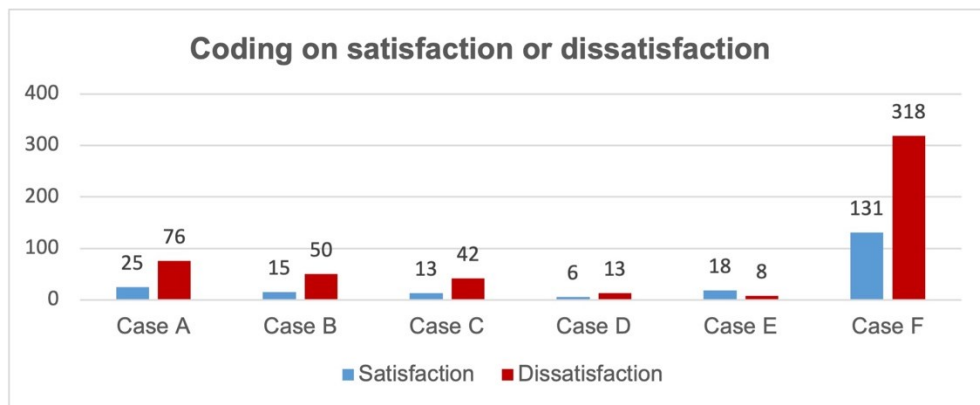
In the analyzed publications, we noticed that many of the issues are related to aspects of the service's functioning that had recurrent problems, mainly of tangible elements, which is also pointed out by Maioli, Carvalho, and Medeiros (2019). For example, when using a vehicle's reservation system, the user expects it to function correctly. However, if it does not work, it does not meet the user's expectations, and the customer does not receive the expected value, becoming dissatisfied, as noted by Liang, Choi, and Joppe (2018) and Yamada (2019).

We also noted many reports of dissatisfaction related to service charges, such as excessive prices or constant readjustments. The satisfaction of carsharing users can be influenced by cost savings, including the initial cost of investment in a transport option, validating the position of Mont (2002). Thus, users may stop using

the service because they do not consider its value fair and adequate or find other options, they feel are more viable.

Chart 6 shows the 715 comments coded in this unit, separated by case and counted in satisfaction (total of 208) and dissatisfaction (total of 507). Comparing the cases, it appears that practically all companies had more comments of dissatisfaction than satisfaction.

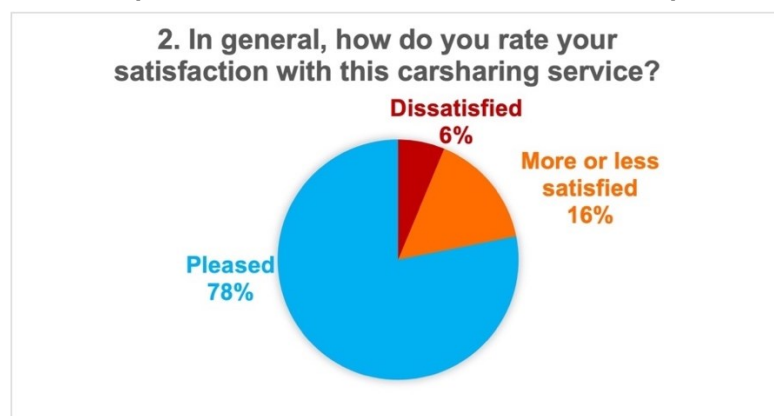
Chart 6 – Distribution of coding on satisfaction or dissatisfaction



Source: Own Authorship (2021).

However, when consulting users through the questionnaire, 76% of all respondents were satisfied with the carsharing services used (Chart 7).

Chart 7 – Response to the satisfaction item in the user questionnaire



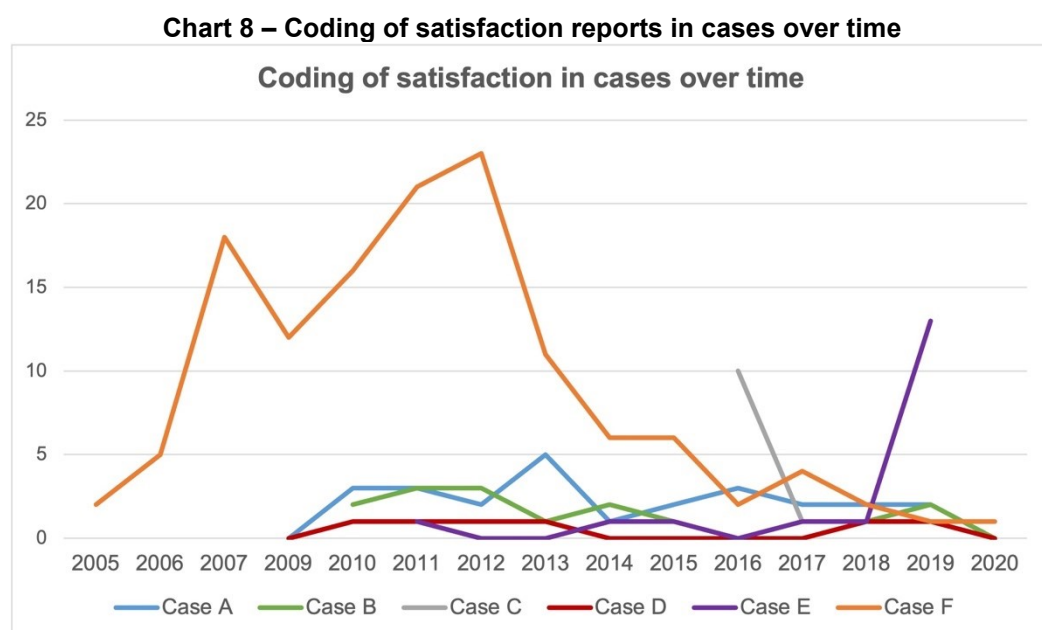
Source: Own Authorship (2021).

Thus, we noticed a disparity between the collected comments and the responses to the questionnaire. This is partly because, in tweets, dissatisfaction is often related to an aspect of use, such as issues in accessing the car, using the

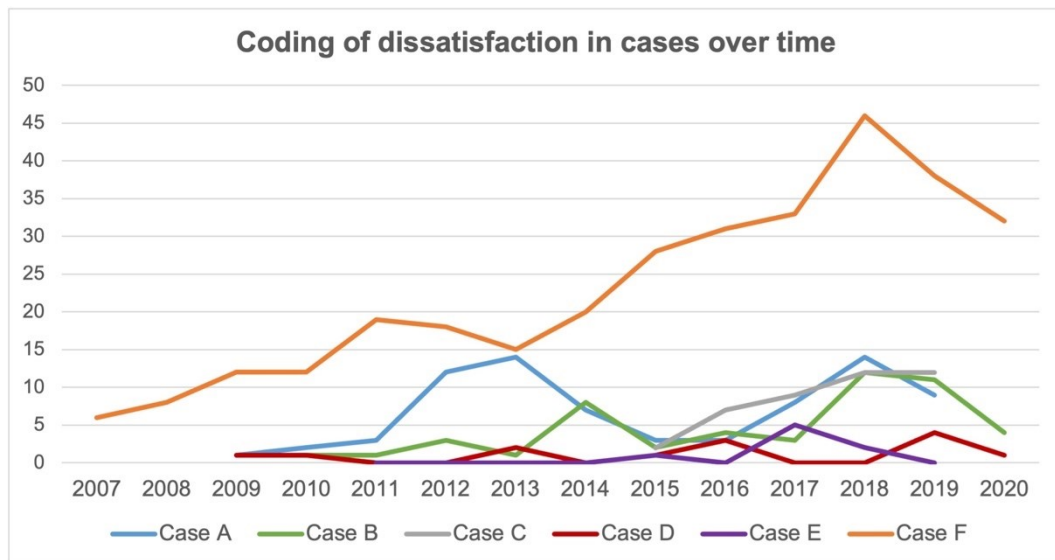
reservation system, or finding parking spaces, which did not deliver the expected value by the client, corroborating the propositions of Liang, Choi, and Joppe (2018). On the other hand, the question asked in the questionnaire was more comprehensive, leading the respondent to assess their general satisfaction with the service. In this case, users considered all of their use experiences and responded based on the assessment they made between expectations and the value they received for using the service.

Concerning this registration unit, we also point to one caveat: there is a tendency to find a more significant number of reports of dissatisfaction, as people tend to expose their anger and issues more than their compliments in the online environment, confirming what was also proposed by Dancer, Filieri, and Grundy (2014). In addition, review websites such as Yelp show more complaints. Users are dissatisfied and want to expose the issues faced to prevent other consumers from going through the same situation, which also serves as a source of consultation for future consumers. In one of the client's tweets, we noticed that many times those who speak up online do this to file a complaint, making it easier to find people complaining than complimenting.

Still, in this unit, it is highly relevant to check the evolution of comments over time, noting whether there are peaks or a trend of dissatisfaction, indicating a more significant issue that the company should analyze. Charts 8 and 9 show this distribution over time of satisfaction and dissatisfaction reports, respectively.



Source: Own Authorship (2021).

Chart 9 – Coding of dissatisfaction reports in cases over time

Source: Own Authorship (2021).

In case F, it is possible to see a drop in satisfaction reports from 2013 onwards, while dissatisfaction reports begin to increase in the same period. Once again, the caveat is that case F has a greater volume of coded comments as it has been mentioned on the platforms since 2005, while the other companies started in 2009. As for the interruption cases (A, C, and E), it appears that there were more reports of satisfaction in the initial years of activity, which decreased towards the end, along with an increase in reports of dissatisfaction. Cases B and D also show a similar trend.

When observing the companies' actions regarding satisfaction and dissatisfaction comments, we identified that companies B, E, and F applied satisfaction surveys to their users with a minimum annual frequency. These surveys are sent to the customer registration email via newsletter. It was not possible to identify whether satisfaction surveys were carried out for cases A, C, and D. Still, we found that companies C and D interacted and responded to users' reports of satisfaction and dissatisfaction. On the other hand, only companies A and E did not interact or react to these reports.

Thus, despite all companies having more dissatisfaction comments, in the cases of continuity (B, D, and F), companies maintain feedback surveys and more constant interactions with their customers. Therefore, it is essential to carry out satisfaction surveys with users, in actions such as requesting feedback after using the service, in the application itself, and sending satisfaction surveys via e-mail, to

assess the customer's expectations regarding the service they receive. In addition, the use of information shared by customers themselves, whether on social media or review websites, also helps to measure satisfaction level, a perception that contributes to the ideas of Wilhelms, Merfeld, and Henkel (2017); Casprini, Minin, and Paraboschi (2019); Yin, Qian, and Shen (2019). Companies can interact with users through these channels and show their concern to understand their issues and be willing to solve them.

These surveys actions are important for the company to understand how users assess the expectation and perceived value. They are also relevant because service satisfaction is one of the aspects that determines reuse intention and consequently customer loyalty, which corroborates the propositions of Cheng, Fu, and Vreede (2018); Gallarza, Gil-Saura, and Holbrook (2011); Hu (2019); Liang, Choi, and Joppe (2018).

4.3.1.3 Customer retention, reuse, and loyalty

In this registration unit, we verified the level of reuse intention and customer loyalty (Akhmedova, Marimon, and Mas-Machuca, 2020; Cheng, Fu, and Vreede, 2018; Hu, 2019) and whether the company is aware of and implements strategies to retain its customers. Considering the users' perspective, we identified the service reuse intention and loyalty in the comments and responses to the questionnaire. In addition, in the tweets and reviews, we searched for reports that indicated the continued use of the service, as in the examples:

I love @F. Been using them for the past 5 years, and whenever there's a problem, they graciously solve it. #qualitycustomerservice Thx! (Tweet from June 01, 2013).

I have been using @F over two years now. This is why I love them. (Yelp review from January 15, 2010).

In some reports, the customer used the service when traveling to a city or country with service operation, stating the desire to use it again in future opportunities.

@C I'm wishing to use you again! I love arriving at Berlin and knowing you are always there waiting me :) (Tweet from December 04, 2017).

In other publications, we found that loyal customers, in addition to reusing the service frequently, also showed specific loyalty behavior, such as disseminating their positive experience with others through social media, as already exposed by Coxon, Napper, and Richardson (2019):

Ok @A u officially have a loyal customer. (Tweet from June 19, 2012).

@C just used the service and I fully approved!!! Very nice, comfortable and perfect customer service!! I will loyal of it! (Tweet from August 30, 2016).

@A – thank you for having amazing customer service & for issuing me a credit! Will totally continue to utilize your service! #Austin. (Tweet from March 22, 2011).

We also coded descriptions of customers who sold or showed the intention of no longer having their cars, as they can travel with other transport services, including carsharing.

9 years and counting with no car ownership using @F around London with the family. (Tweet from September 29, 2019).

My car has been sitting in my driveway for 2 weeks. I may get rid of that ball and chain soon. Thanks to @A. (Tweet from May 08, 2010).

Officially carless for the first time since 18 yrs old. Let's see how life plays out on foot, bike and @A. (Tweet from September 17, 2012).

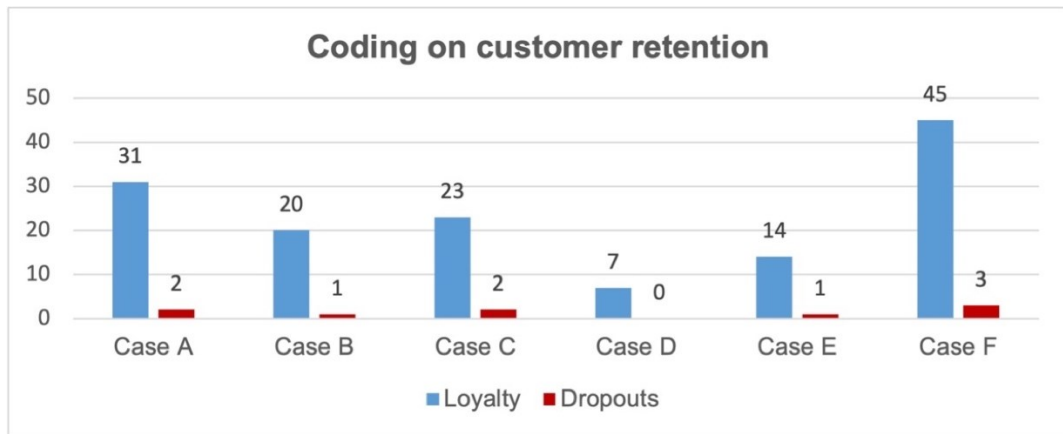
Even customers who published dissatisfaction complaints also posted comments stating that they want to continue enjoying the service as long as they have benefits and cheaper rates. We identified a few posts that showed the user's withdrawal. In these cases, the consumer had an awful use experience, or a series of them, which made him distrust the service and not want to use it anymore or seek the service of a competitor company.

@F Very unhappy with your services. I'm a loyal customer and this is the second time that I am late because of a late customer. (Tweet from June 16, 2018).

Was it this change in the contract that they sent me an SMS yesterday to let me know??? Help!!!! I will return to a conventional car rental. (Tweet from October 25, 2017).

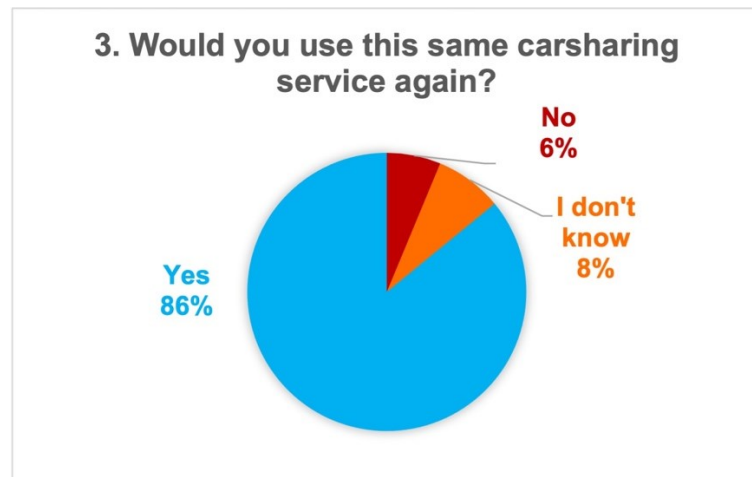
Chart 10 illustrates the 149 comments coded in this unit, separated by case and distributed in loyalty (total of 140) and dropouts (total of 9). Chart 11 shows the total responses to the user questionnaire when we asked if they would use the carsharing service again.

Chart 10 – Distribution of coding on customer retention



Source: Own Authorship (2021).

Chart 11 – Total responses to the user questionnaire on reuse and loyalty



Source: Own Authorship (2021).

In the comments regarding cases B, C, D, and E, we found that the recurrent use and loyalty to the carsharing service are mainly due to the reduction of costs and freedom compared to owning a car, the proximity to the place of work or residence, and to the use combined with other transport modes as needed. In cases B and D, electric cars were also identified as a service differential and reason for reuse. Thus, it appears that reuse is mainly due to economic and environmental reasons.

In the reports of giving up the service, some stated that they no longer use it due to a lack of vehicles in the neighborhood or region. We also identified users frustrated with the company's lack of empathy, courtesy, and interest in contacting its customers, including the assertion that consumer loyalty does not matter. There were also posts of giving up related to the constant price increases, or the high price compared to other means of transport.

Concerning the companies' actions and strategies to retain customers, the frequent satisfaction surveys sent by companies B and F to their users contribute to understanding what can be improved in the service from those who already are customers. Company E shared discount coupons for uses in specific periods such as holidays, encouraging continued use by customers. Company F frequently publishes messages encouraging the use of carsharing, with an environmental and sustainable appeal. In the case of company F, there is also a nickname to call its customers, which helps to create a sense of belonging to a sharing community, an aspect also addressed by Möhlmann (2015). The company has also launched campaigns for customers to encourage friends and family in actions such as a 30-day Low Car Diet.

Therefore, we understand that companies need to show interest in valuing and retaining frequent customers, and not just worrying about attracting new customers, as the return of already registered customers contributes to long-term survival and profitability, a perception that validates ideas by Lee, Lee, and Kim (2019). In this sense, the company can reward its older customers, providing benefits and loyalty programs, which help to encourage recurrent use. These actions are essential to maintain a relationship between the company and its customers, seeking to generate value with each reuse of the service and contributing to loyalty, which is seen in the loyalty behavior of disseminating the positive experience to other people through eWoM, an aspect also verified by Coxon, Napper, and Richardson (2019).

4.3.1.4 Electronic Word-of-Mouth (eWoM)

In the eWoM registration unit, we checked the level of intention to recommend customers for using the service. In the comments, we searched for descriptions in which people recommend or not the service, as well as publications

that show enthusiasm for using the service for the first time and the desire to publicize how much they like the company, as proposed by Zhang, Jahromi, and Kizildag (2018). In the responses to the questionnaire, we sought to verify the percentage of users' intention to recommend the service used to others. From the companies' point of view, we sought to identify whether the company is aware of its eWoM and how it interacts with what users post about it on social media.

We identified publications with a positive and negative focus. In the positive eWoM codings, two main profiles were identified: (1) reports from recurring users, with direct compliments to the company, mentioning the ease of use and the innovative and eco-friendly features of the services, and (2) others who are using it for the first time and want to share their curiosity about testing the service, their enthusiasm when using it for the first time or driving an electric vehicle:

Have I mentioned how much I love @A? (Tweet from April 23, 2012).

My @A membership card just arrived! Looking forward to driving my first Smart car tomorrow! (Tweet from June 04, 2010).

Thinking about going #green with car program. No insurance payments, gas, drama and no sign up fees right now (Tweet from February 23, 2012).

We also observed reports from individuals asking if others know and have used the services, asking for recommendations:

Thinking about joining @F. Any feedback on using them? #YayOrNay? (Tweet from July 29, 2013).

Today I discovered the @E app I want to know if it's good, has anyone used it? (Tweet from August 19, 2019).

In the negative eWoM codings, we identified complaints from people not recommending the service because of their bad experiences. We also noticed reports from users who mention two companies and say that one is better than the other, or that they are giving up on one to use the other, and even individuals who gave up using the service based on the negative comments from other people, which was also observed by Yamada (2019) and Yin, Qian, and Shen (2019):

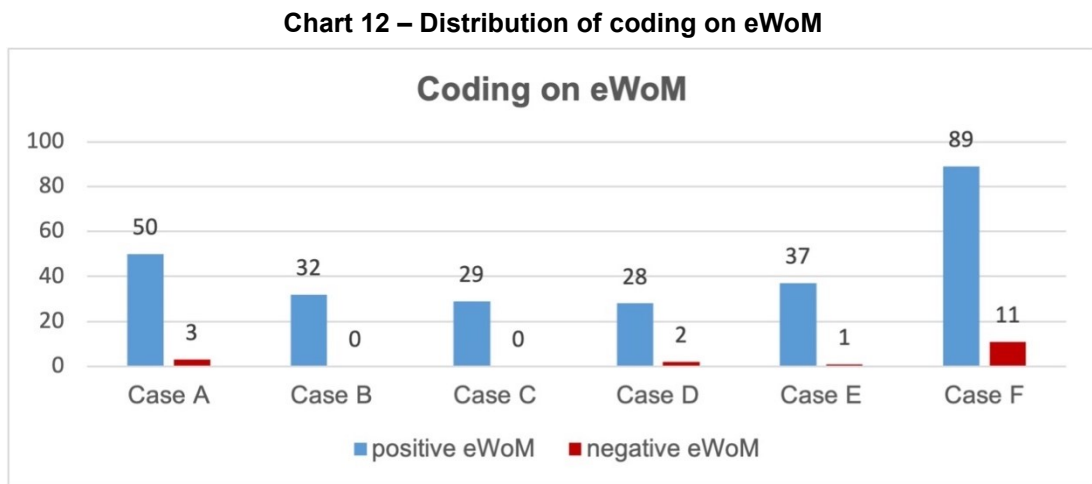
Don't signup with @F. They have fake policies and they won't even give you proper answers when you will call them. Moreover I talked with an agent and

she was super arrogant. Thanks for cheating a customer with student account. (Tweet from September 29, 2019).

Goodbye @A, I hope @D is still around. (Tweet from April 10, 2020).

Thank you for the warning. I was going to sign up for #F but you've made me think twice. (Tweet from February 21, 2019).

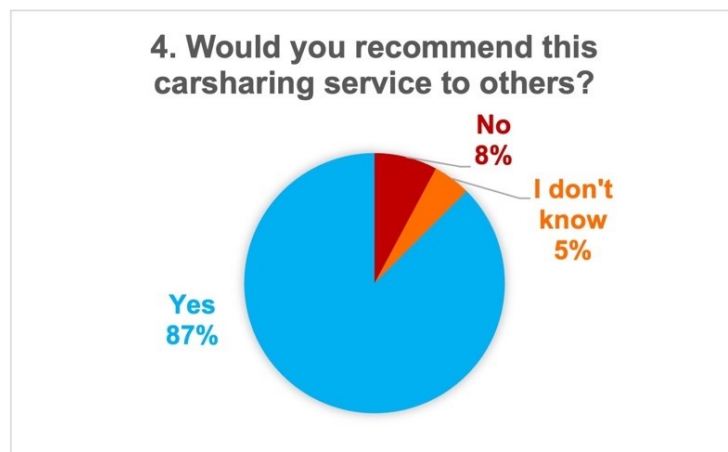
Chart 12 illustrates the 282 comments coded in this unit, separated by case and distributed in positive eWoM (total of 265) and negative eWoM (total of 17).



Source: Own Authorship (2021).

Chart 13, on the other hand, shows the total responses to the user questionnaire when asked if they would recommend the service to others.

Chart 13 – Total responses to the user questionnaire about service recommendation



Source: Own Authorship (2021).

We found a more significant amount of positive eWoM reports in this unit, and almost 90% of the questionnaire respondents said they would recommend the service to others. Unlike the satisfaction unit, where users reported issues with some aspects that left them dissatisfied or satisfied, the eWoM unit considers the user's opinion about the company and what they say about it on social media. We perceived the users' desire to share with others that they are using the service, their enthusiasm or approval in using electric vehicles, and the adoption of more sustainable practices such as shared use. Further, we also observed fewer comments of negative eWoM, with the non-recommended service. Most of the dissatisfaction reports only brought the customer's anger with the issue, the company, and the service, but they don't mention their non-recommendation.

Looking at companies' attitudes towards their eWoM, we found that company A did not interact with its customers on Twitter despite having few negative reports. Company B received positive comments about the service and its integrated use with other modes such as bicycle and subway. Companies B and D interact and respond to users' tweets and use Twitter as a channel to spread information. In the case of company C, its main attraction was electric cars, with comments about the enthusiasm of driving one for the first time. Company C interacted with customers on Twitter through the CEO's profile, not the corporate page. Company E promoted several campaigns such as retweets and the use of specific hashtags to encourage users to gain benefits, in addition to having a laid-back interaction with its customers, responding to tweets, and using Twitter as a channel to disseminate information.

Company F had the most eWoM reports, both positive and negative. This is possibly because it has been on Twitter since 2007. Another reason may be related to the fact that it is an American company, the country with more active users on Twitter (Tankovska, 2021), and also because of the country's culture of using social media as a channel to share opinions. Company F interacts and responds to users' tweets and uses Twitter as a channel to disseminate information. In addition, it also makes use of hashtag campaigns to encourage shared usage. Another company's action is to give creative names to the cars instead of just identifying them by model or code. This makes users publicize more and enjoy sharing which car they used or which vehicle was reserved for their use.

Hence, after analyzing the data in this unit, we verified how users use eWoM as a tool and resource to ask for recommendations on the use of services. In some

cases, the experience and reports from others are crucial for an individual's decision-making, even if they have not yet used the service, an aspect also verified by Yamada (2019) and Yin, Qian, and Shen (2019).

We also noticed that customers use online platforms to share their opinion about companies, both for positive and negative experiences, to make their assessment (ratings), in the case of Yelp, and also to point out the good and bad aspects of the service, as mentioned by Wang, Lian, and Zhao (2019). For companies, this spontaneous feedback can be used together with satisfaction surveys to verify points of improvement, a perception that is in line with the proposals of Zuo et al. (2019).

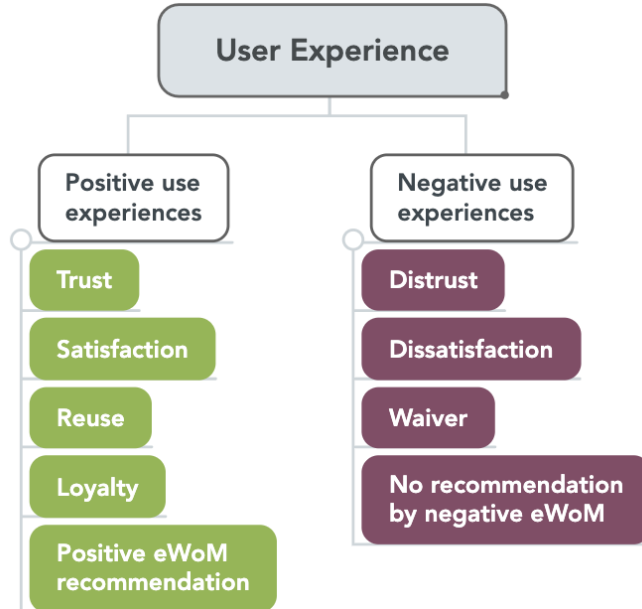
Finally, we also observed that some companies were more present and active on social networks. Thus, it highlights the importance of each business understanding its audience, researching where it is most present, and maintaining engagement with its customers in these media. Furthermore, we noticed that users appreciate when the company demonstrates interaction, which conveys closeness, empathy, and courtesy. However, they get frustrated when they try to interact, and the company does not respond. Thus, eWoM helps to develop and strengthen the company's relationship with its customers, in addition to increasing engagement with other actors in the network, reiterating the ideas presented by Baek et al. (2018); Hu (2019); Li et al. (2019) and Sopjani et al. (2019).

4.3.1.5 Synthesis of the User Experience Category

After analyzing these registration units separately, we understand that they all interact and interfere with the user experience when using a carsharing service. Figure 31 outlines this relationship. Going through a series of positive experiences using the service makes the user feel confident with the company and satisfied with the received, contributing to its reuse and possible loyalty. And depending on their level of satisfaction and loyalty, the customer may want to disclose this to others through positive eWoM. However, suppose they go through negative experiences. In that case, the opposite can happen, generating distrust and dissatisfaction, with

possible dropouts, and depending on the level of dissatisfaction and bad experiences, the non-recommendation by a negative eWoM.

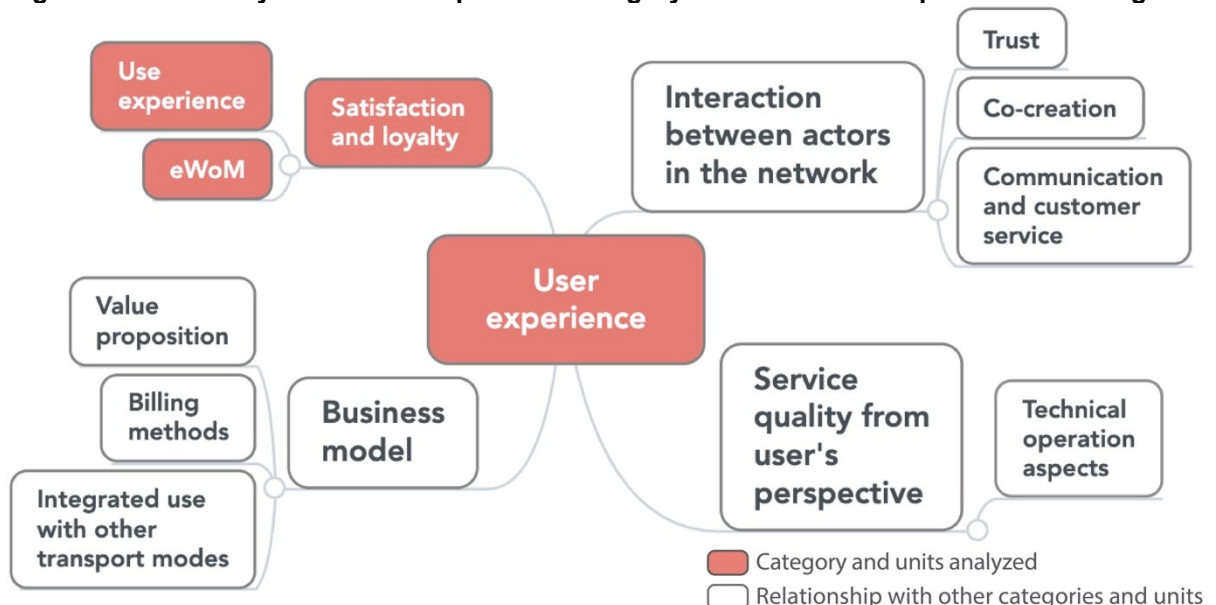
Figure 31 – User experience category synthesis



Source: Own Authorship (2021).

Although the analysis has presented each registration unit individually, it is also possible to notice that there are relationships between the registration units of the User Experience category with the other analysis categories and their respective units, which we will analyze next. Figure 32 illustrates these relationships between categories and units.

Figure 32 - Summary of the User experience category and its relationship with other categories



Source: Own Authorship (2021).

We understand, therefore, that user experience is related to aspects that involve the business model of a mobility service, such as the service's value offer, forms of billing, and integrated use with other modes. During their experiences with carsharing, users may also come across situations that understand the technical aspects of operation, implying their perception of service quality. Finally, the use of carsharing services involves the interaction between the different actors that constitute its solution-demand network. This interaction between the actors occurs through the user's **trust** in the service and the **shared use** and **co-creation actions between actors**. Furthermore, communication and forms of relationship reinforce the bond between companies and other actors and users. Thus, all these aspects somehow impact the user experience, influencing their satisfaction and loyalty. Therefore, the user experience is a relevant factor that needs to be constantly monitored during the operation of a carsharing service.

4.3.2 Analysis Category of Service Quality from User's Perspective

The second analysis category we established was the Service Quality from User's Perspective. This category analyzed aspects related to access and availability, security and privacy, maintenance and cleaning, continuous improvement, communication and customer service, operation and coverage area, charges and prices, and flexibility. The following subsections present the analysis of these registration units identified in the cases, considering the data collected on Twitter, Yelp, and questionnaires.

4.3.2.1 Access and availability

In this unit, we sought to verify the users' perception about the access and availability of services in the comments collected. Therefore, we searched for descriptions that mentioned access to the application, website, registration, and use of the access card, location, and picking up cars, among other utilitarian aspects and

efficiency in the use of the service, pointed out by Maioli, Carvalho, and Medeiros (2019); Mattia, Mugion, and Principato (2019); Möhlmann (2015).

We've coded a few compliments related to the app's functionality and usage of some of the services:

@F app is from you? Awesome work whoever did it! (Tweet from June 08, 2009).

@A has the perfect platform to provide accurate (GPS) details of mobile cellular data network performance of their provider. (Tweet from January 26, 2012).

@A, the radar functionality of the updated iPhone app is freaking fantastic. It's exactly what I wanted. Thank you! (Tweet from June 26, 2013).

Most of the comments, however, were about various complaints involving service use: delay for approval of the initial registration, issues with login and access to the website and app, instabilities and servers down, problems locating, unlocking, and starting vehicles, and problems with the general use of the application, on various devices:

The one and only problem with F...make sure you know exactly where the car is before you go...don't leave the house with a vague idea, if you haven't walked past it or rented the car before print out the map, trust me I've been lost in my neighborhood looking for the right alley and gotten well it's in between tremont and Shawmut....so definitely really know where the car is before you go because the staff of F don't! (Yelp review from April 13, 2006).

@F are you having issues with website and app? I am trying to login and it doesn't work. On desktop I get a 403 forbidden message and on the app it just doesn't log in. I need to change a trip. Can you help? (Tweet from July 30, 2020).

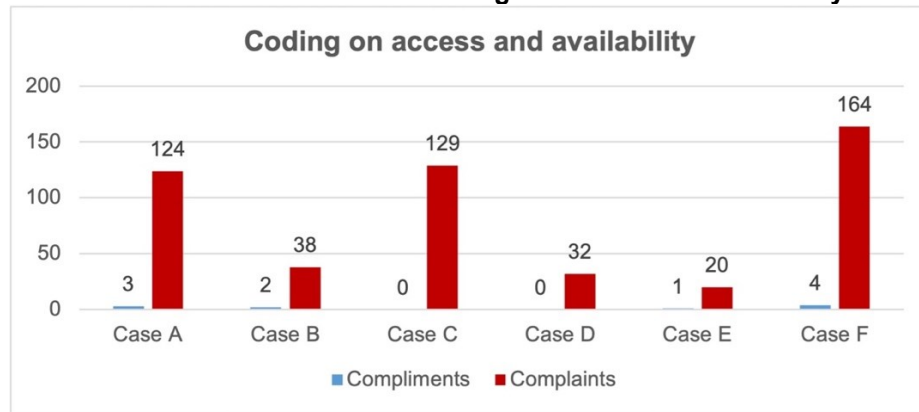
Your app is broken at the moment and website down. How long will it be offline for? (Tweet from October 02, 2015).

@A, your app is so glitchy and undependable. Trying to add a new method of payment and getting an error message. Everything is updated and I tried both the app and the website. (Tweet from April 03, 2018).

@A, love the concept, but the software in cars is buggy. Have had issues starting or ending reservations 3 out of last 4 times. (Tweet from July 30, 2015).

Chart 14 shows the distribution of the 517 comments coded in this unit, with 10 compliments and 507 complaints. This was the unit with the most coded complaints.

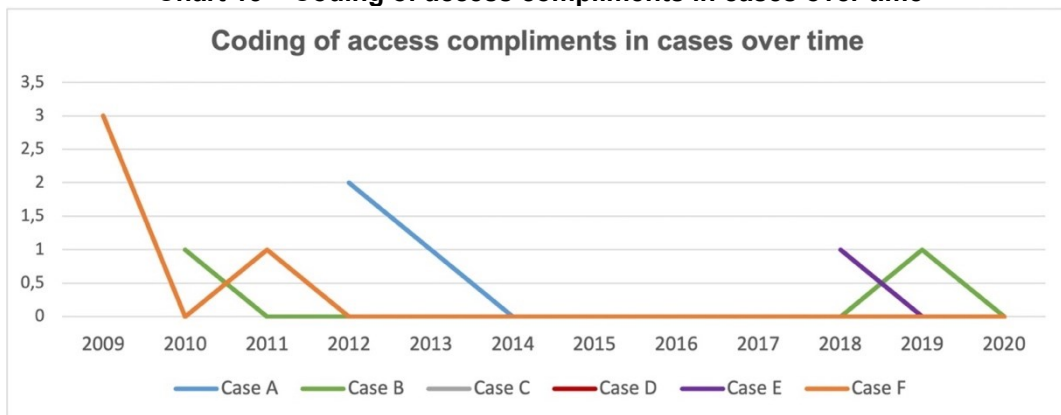
Chart 14 – Distribution of coding on access and availability



Source: Own Authorship (2021).

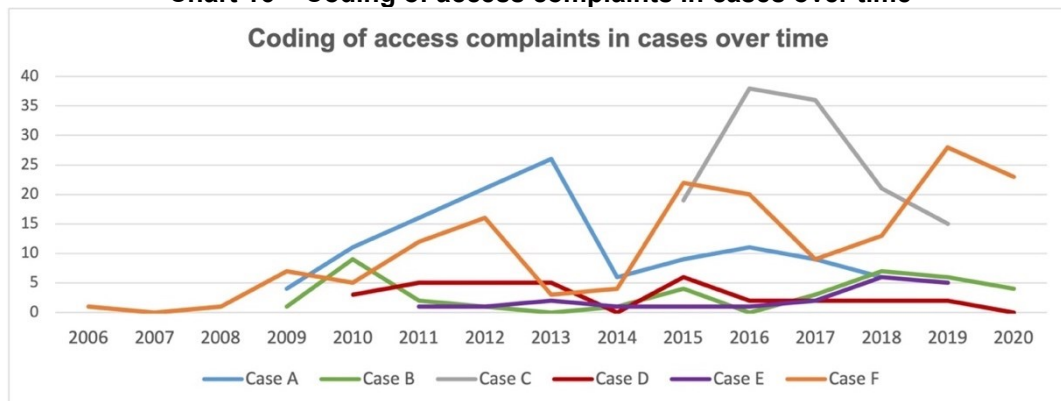
Cases A, C, and F had a similar number of complaints, but while cases B, D, and E registered a smaller number, all cases had very similar problem reports. Charts 15 and 16 illustrate the distribution of these compliments and complaints by the service's operating time. It is possible to notice that all of them show a tendency for complaints to grow over time, with some declines, especially in cases of interruption, close to the period of their closure.

Chart 15 – Coding of access compliments in cases over time



Source: Own Authorship (2021).

Chart 16 – Coding of access complaints in cases over time



Source: Own Authorship (2021).

Thus, it appears that access and availability problems are frequent and recurrent in all cases, both continuity and interruption. In a sense, it is one of the aspects in which the most complaints appear as it is directly related to any problem faced by the user when using the service, in addition to covering technical aspects such as efficiency, customer service, system availability, ease of use and navigation speed, confirming what is pointed out by Maioli, Carvalho, and Medeiros (2019) and Möhlmann (2015).

There is also a direct relationship of this unit with communication and customer service, as when users face problems in use, they try to contact the company to activate the communication or support channel, as noted by Cheng, Fu, and Vreede (2018). As a result, such complaints can be aggravated if, in addition to the problems faced during use, the customer can also not resolve them through this contact.

Likewise, there is also a relationship between access and usage problems with trust, both in the company and in the service platform or in technical devices such as an application, vehicle, and website, which contributes to the ideas proposed by Miramontes et al. (2017). In the comments, some users claim that they stopped using the service because they faced frequent and recurrent problems, losing their trust and motivation to reuse the service, reaffirming the conceptions of Liang, Choi, and Joppe (2018). Other customers mention that if companies continue with these issues, they will soon need to close their activities precisely because of users' lack of trust in the service.

We can infer, therefore, that this is a dimension that deserves special attention from companies. In some of the users' comments, companies try to inform their consumers in advance about updates and possible instabilities in the connection or servers. Still, in other cases, the problems are external and beyond the company's reach. In any case, shared mobility services rely on robust information technology systems, requiring the action of trained actors. So, it is essential to develop partnerships with specialized suppliers, considering both the development of applications, websites, and platforms that allow access and use of the service and the provision of necessary updates, maintenance, and support, which also involve situations related to security.

4.3.2.2 Security and privacy

For this unit, the objective was to verify users' perception of security about the cases, considering both their percentage of responses to the questionnaire and the collection of comments on Twitter and Yelp. In the comments, we sought mentions of physical and online security aspects in the service use, as pointed out by Cheng, Fu, and Vreede (2018) and Parasuraman, Zeithaml, and Malhotra (2005).

In this aspect, we found only negative reports and complaints related to physical safety, such as the use of damaged or unmaintained vehicles, with flat or worn tires, or models not suitable for driving snow, access problems in remote areas, and other complaints related to the limited coverage of insurance included in the rental, which only covers minimal protection, with users stating that they do not want to drive without an option with an insurance package. It was possible to observe the users' concern of users in the comments, using terms such as "dangerous," "it is a safety issue," "a damaged vehicle is not safe," and "lack of consumer protection":

There is a serious issue with F service, which another yelp reviewer talked a bit about - they only cover you at the state minimum required insurance rate. Their cars are covered, but if you cause damage to someone else's car there is a \$500 deductible and \$10K max. So if you send someone to the hospital you could be SCREWED. (Yelp review from July 15, 2007).

I've called every day, but car remains abandoned in a private driveway in a rural area @F knows that its cars sometimes break down out of cell service range, admits F agent. Everyone needs to know! This is a safety issue! (Yelp review from July 20, 2019).

A damaged vehicle isn't a safe easy ride at all. Waiting on hold for 10 mins isn't either. No refund. Not good service... (Tweet from September 08, 2017).

The Smart ForTwo is TERRIBLE in winter!!! DONT do it, unless using one of the 4-door Mercedes Benz SUVs or sedans! Smart ForTwo is fine in Spring/Summer/Fall though! Overpriced. Too many fees, and the Smart cars drive like crap in the Montreal winters! Actually REALLY dangerous! (Yelp review from January 03, 2018).

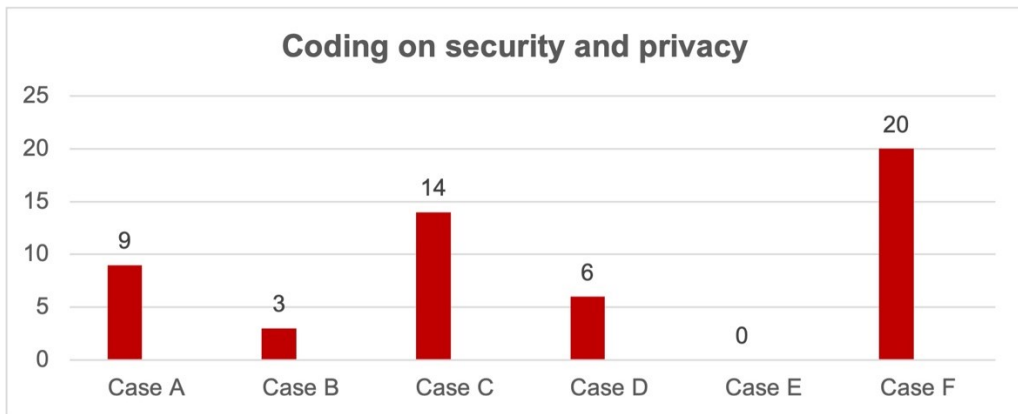
There are also reports of issues with data privacy, passwords, and online security. In these cases, many users reported problems registering passwords or considered the security system fragile and unsafe.

Thanks for not protecting your customers. There's been an information hack and my details (bank/personal/email) have been used on other platforms. This is disgusting (Tweet from July 08, 2020).

@D I just signed up with you. But does it have to be that you send passwords around unencrypted by email? You can improve your registration process a lot (Tweet from September 06, 2018).

Chart 17 illustrates the 52 complaints comments coded in the security and privacy unit, while Chart 18 shows the responses to the user questionnaire on data privacy and physical security, respectively.

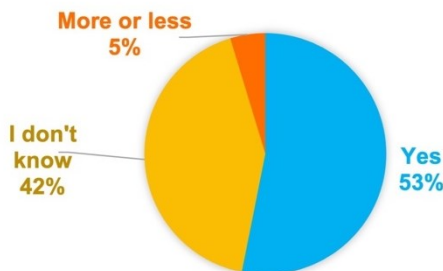
Chart 17 – Distribution of coding on security and privacy



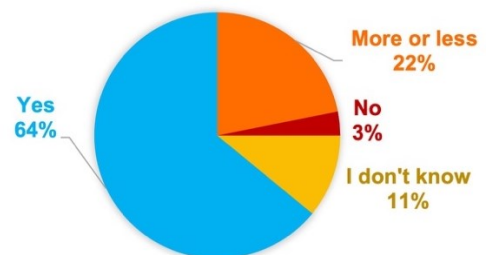
Source: Own Authorship (2021).

Chart 18 – Total responses to the user questionnaire on privacy and security

6. In your perception, does this carsharing company guarantee the privacy of your data?



7. In your perception, does this carsharing company guarantee your physical well-being?



Source: Own Authorship (2021).

Observing the number of coded comments, we consider that aspects related to physical security and privacy should always be working correctly from the user's perspective. Therefore, it is a unit that will possibly only be mentioned when users have issues, as the company should always ensure physical security and data privacy when providing the service.

Although in the responses to the questionnaire, more than half of the users answered that they consider that the company guarantees their physical and data security, this aspect is not completely clear for those who use such services. In particular, regarding data privacy, 42% responded that they do not know if the company really guarantees their confidentiality, which shows that the company's actions to ensure this security are not seen or are unclear to its consumers.

Thus, we understand that security is one of the operations and usage dimensions that impacts the quality perception and assessment that the user makes of the service, which was also observed by Parasuraman, Zeithaml, and Berry (1985). Suppose a user has any situation in which they consider that their physical security or privacy was not guaranteed. In that case, they can evaluate the service as unsafe and consequently without quality, which interferes with their decision to continue using it. It is essential to emphasize in this unit, therefore, security in the digital environment, considering the privacy of the user's data, and physical security, which must be guaranteed by the periodic maintenance of vehicles, which reiterates the issues raised by Cheng, Fu and Vreede (2018) and Parasuraman, Zeithaml and Malhotra (2005).

4.3.2.3 Maintenance and cleaning

The objective of this unit was to identify users' perceptions about maintenance and cleaning in the services they used. From the collected publications on Twitter and Yelp, we searched for comments that mentioned clean or dirty, damaged or with maintenance problems, aspects also verified by Lagadic, Verloese Louvet (2019) and Yin, Qian, and Shen (2019).

We found only a few compliments concerning maintenance and cleaning, and these comments are old, from 2006 to 2011, which indicates that the cars were probably new or with little use.

In some ways using F service is even more convenient than having your own car -- no worry about repairs or even cleaning (I know some people have had problems with other users leaving the cars dirty, but in my experience even the dirtiest car is about 100 times cleaner than my own car ever was). The cars are almost all new or nearly new. (Yelp review from July 26, 2006).

The cars are clean and drive well, they are well maintained and I usually get a pretty new car. (Yelp review from January 14, 2011).

We coded many more complaints, mentioning dirty cars with a foul smell or cigarette odor, stains or animal hair on the seats, and trash waste. In these reports, it is clear that the complaints are more related to the misuse of cars by customers since it is the user himself who should remove his garbage after using the vehicle or not smoking in a shared-use vehicle.

I rented a car from F from a Leather District location (Lincoln St) - a Kia Soul "Sipos" and it was so smelly and filthy! I could not believe the smell, actually. It did not smell normal. It reminded me a rotten jar of pickles left sitting in the sun for days. It was just disgusting. The rear seat was stained, so I wonder if an animal did their thing there? It was my first experience renting a car from F and I'm horrified that next time I have to rely on their service it will be just as bad. I hope not, really. (Yelp review from May 29, 2012).

3 out of 4 cars were dirty including what was clearly a weed-mobile that stank of skunk. The others were either littered with fast food condiments or had never been cleaned. (Yelp review from November 20, 2015).

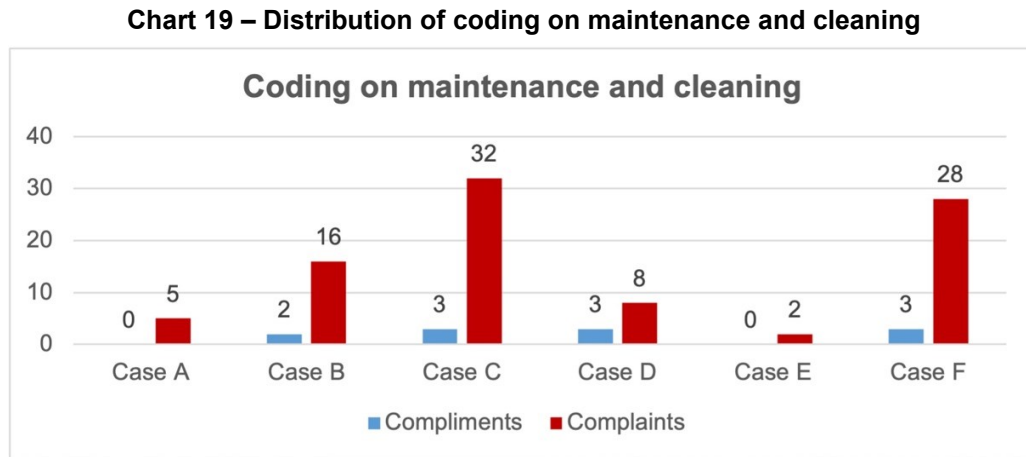
Other comments cite maintenance problems, such as damaged cars that should be removed from circulation until repaired, flat tires and broken mirrors, or electric vehicles without a charge. Some even mention how the company should pay more attention to vehicle maintenance and penalize users who misuse vehicles. They are paying a high amount for the temporary use of cars with many maintenance and cleaning problems.

Very convenient, plenty of cars all around town. They fill a crucial niche. However, maintenance of fleet is horrible. From worst to worstest: I'm paying for the time it takes to dig the car out of the snow? Car was obviously smoked in (tobacco). Sure, maybe that just happened. Car was trashed, and was obviously smoked in (weed). Again, maybe I was the next driver post incident. Car fender was severely dented, and card reader barely attached to window. Is this just my bad luck? Kinda seems like they don't care about maintenance or kicking out people who abuse the vehicles. Tragedy of the commons, I guess. (Yelp review from April 22, 2018).

@F in another filthy car. Come the hell on... If you're charging ridiculous amounts of \$ to borrow your cars, at least clean them! (Tweet from May 02, 2020).

Someday I will get a @A that isn't filthy and isn't full of trash and doesn't smell like smoke and I promise to tweet about it. Today is not that day. So far I've rented maybe 5 or 6 times and not one clean car. I think they just never clean them, honestly. (Tweet from June 28, 2018).

Chart 19 shows the distribution of 102 comments coded as maintenance and cleaning, separated into compliments (11) and complaints (102).



Source: Own Authorship (2021).

Regarding the companies' actions on maintenance and cleaning, company D informs its users that it performs internal cleaning at least once every two weeks and advises users to report signs of misuse, damage, and dirt, before starting the rental. In addition, case C provided functionality to consult the car's cleaning status before booking, which was informed by users when they entered the car. On the other hand, Case A had a feature that allowed evaluating the state of the vehicle after its rental by the last user.

Analyzing all comments coded in this unit, although some companies received more complaints than others, they are all very similar, indicating a general problem in the maintenance and cleaning of carsharing services, which seems to be getting worse with the time of operation. In addition to the problems caused by users, there are issues related to the company's lack of maintenance and inspection. In this sense, the service provider needs to be more active, implementing continuous care and periodic cleaning processes, supporting the ideas of Niemimaa et al. (2019).

Another problem is the control and inspection of vehicle misuse. A solution would be to implement teams of local partners responsible for monitoring the vehicles' conservation state, distributed in the company's area of operation. Another form of inspection is the system for evaluating the car's condition by users before starting the rental, although some companies have used this solution. Charging fines for misuse would also be a way to avoid damage. However, in some reports, the

system penalized those who used the vehicle afterward and not those who committed the harm.

Furthermore, it needs to be clear in the services which are the responsibilities of the company and users. The company must do its part to guarantee the periodic maintenance of the vehicles since this cost is included in the amount paid by the customer, as pointed out by Couzineau-Zegwaard and Meier (2018) and Stocker and Shaheen (2017). Maintenance is also part of the tangible aspects of service quality and interferes with consumer satisfaction and reuse, which aligns with the propositions of Arcidiacono and Pais (2018) and Coxon, Napper, and Richardson (2019). Many users, however, drive shared cars as if they were the only owners without considering that their actions impact the user experience of the next customer.

Therefore, in many of the reported problems, there is a relationship with user behavior, requiring education and behavior change in the use of shared services, confirming the contributions of Tukker (2004). Although it is the company's responsibility to ensure periodic hygiene, cleaning also depends on good use by users, such as in the collection of waste itself. Likewise, in colder cities, users themselves must remove the snow from the windows and hood before use, but the company must supply and equip the cars with specific shovels for this purpose. Some users recognize that the issues are related to shared usage, so rating systems could help monitor these issues. However, it is vital to educate users about their responsibility better. Even if they are paying for the service use, proper functioning depends on collaboration and mutual respect among all actors in the solution-demand network. The company can also mitigate some of the usage problems by constantly monitoring and consulting its customers on suggestions for improvement.

4.4.2.4 Continuous improvement

This unit aimed to analyze users' perception of continuous improvement and the company's posture regarding feedback and suggestions received. We coded Twitter and Yelp comments with the terms: suggestion, feedback, implementation, update, improvement, and collecting the users' questionnaire responses.

Most of the positive comments are related to the update or implementation of new features in the service application, suggestions for improvements pointed out by users, and some responses from companies.

Thanks @F, the add-to-calendar feature is very cool. Now all my resses & info show up in my Google Calendar. Easy access. (Tweet from September 17, 2009).

@A Thank you for adding the "leave a message" option for reporting damage. A big improvement. (Tweet from September 21, 2013).

@E Now a loyalty program would be cool, right? In addition to a quality partnership with someone in the market - suggestion, #carwash #parkings #restaurants #banks #mobileoperators (Tweet from September 26, 2018).

@F We're always looking for ways to improve our new app. Thanks for your feedback! (Tweet from August 14, 2015).

Hi Jessica, it's gonna happen! We're already in Belém, next to the subway. In Mooça we will arrive near the @CPTM_official station. We are also looking forward to our expansion. Thanks for the suggestion, we are always open!! Happy 2019!! (Tweet from January 02, 2019).

The negative comments in this aspect mention updates to the application that got worse or had problems, complaints about the removal of features, and the mention of the lack of quality of the system.

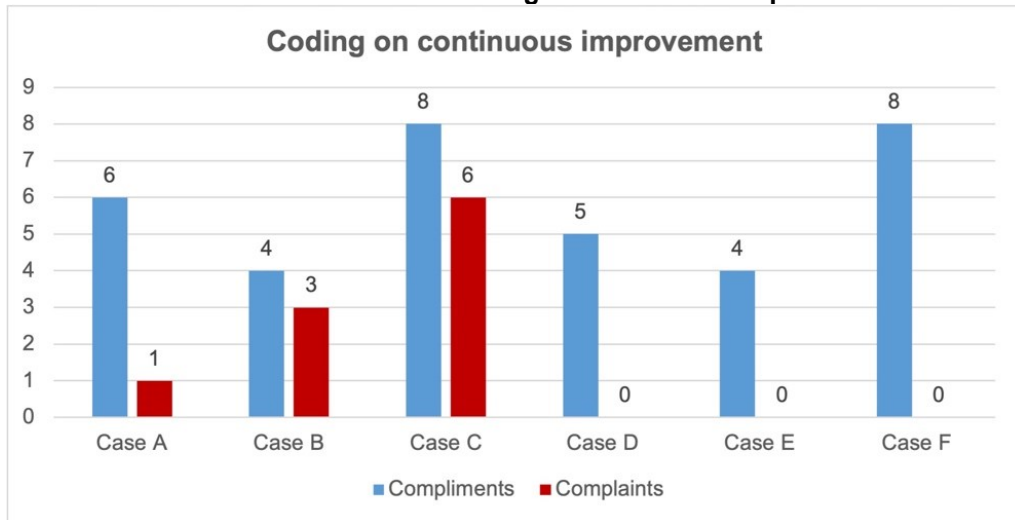
@C 1. The new app sucks! 2. I really don't appreciate being hung up on when I've been waiting to report a car isn't at location (Tweet from June 04, 2017).

@C What means "near future" There are various issues with your app and support keeps telling "fixed in near future" to all of them. (Tweet from February 14, 2017).

@B. Sorry again, I was under the impression quality was important (at least to end users like myself). Congrats on having more users than @A but I hope the system quality improves so you don't miss out on new (and old) members. (Tweet from December 20, 2019).

Chart 20 illustrates the distribution of 45 comments on continuous improvement, with 35 compliments and suggestions and 10 complaints. Chart 21 shows the result of the responses to the user questionnaire.

Chart 20 – Distribution of coding on continuous improvement



Source: Own Authorship (2021).

Chart 21 – Total responses to the user questionnaire on continuous improvement



Source: Own Authorship (2021).

It appears that in this unit, almost half of the users consider that the company promotes improvement actions, and there is a more significant proportion of positive comments than negative ones. This happens because the reports from this unit are more optimistic, emphasizing or suggesting favorable aspects about the use of the service. Of the six cases studied, only one company did not respond to the suggestions and comments of its users on social media. Cases C, D, and F responded to users' requests, compliments, and complaints through social media. In addition to responding to the users' comments, Cases B and E used their profiles to ask how to improve the service, asking users to give suggestions for improvements.

Thus, we understand that in addition to promoting updates and continuous improvement actions, one of the main strategies in this unit is to receive feedback

from customers on what needs and can be improved. The companies could apply this by directly consulting its customers, both through social media and in satisfaction surveys, but also by monitoring what users say through eWoM, about the various aspects of using the service, contributing to the propositions of Casprini, Minin, and Paraboschi (2019) and Roy et al. (2018). This monitoring is important because when questioned, users can make a general assessment and report that everything is working as it should, but it is in everyday use situations that problems and complaints arise.

Another strategy is to understand the user profile and involve them in the design processes, to improve service quality, an aspect also verified by Park and Ramaprasad (2018) and Sopjani et al. (2019). Likewise, the use of Service Design tools, such as the Service Blueprint and the Customer Journey Map, help to identify areas for improvement since Service Design considers the importance of continuous evolution in services over time (Moritz, 2005; Stickdorn and Schneider, 2010). Therefore, we understand that constant improvement issues are part of service quality, and must be constantly sought in communication with customers, to monitor the general perception of users and identify what can be improved, which reinforces the proposed ideas by Wang, Lian, and Zhao (2019).

4.3.2.5 Communication and customer service

For this registration unit, based on data collected on Twitter and Yelp and the responses to the questionnaire, our objective was to verify the user's perception of communication with the company. In addition, this unit comprises empathy, that is, the compassionate consideration of stakeholders or employees for customers (Cheng, Fu, and Vreede, 2018), or concern and courtesy in the individualized attention that the company provides to its customers (Parasuraman, Zeithaml, and Berry, 1985; 1988). It also covers the company's responsiveness, which is its willingness and readiness to help users and provide the service in real-time (Cheng, Fu, and Vreede, 2018; Parasuraman, Zeithaml, and Berry, 1988).

In the comments, we sought users' mentions to any contact channel with the company (by phone, email, online chat, in person, or via Twitter). The term customer

service was often mentioned. In comments analysis, we also looked for the use of terms that characterized the company's customer service, noting both empathy and courtesy in the employees' attitude and the readiness to assist users. More complaints than compliments were found.

In the compliments, there was mention of the quick resolution of problems, such as in cases of reimbursement or issues with accessing and registering the account, and the service classification as helpful, friendly, and polite.

By far the best email from a brand I've recieved. So good, culturaly relevant, and humorous. :-) @F! (Tweet from January 08, 2013).

Thanks @A for quickly handling my issue this morning – friendly and efficient! (Tweet from March 29, 2015).

Excellent service from @E! They attended to me beyond the necessary; I loved it! Thank you very much, and congratulations! (Tweet from August 15, 2013).

Some were impressed and considered the customer service received as an example to be followed by other companies.

Very impressed with @F customer service. Friendly, fast and resolved my issue without fuss. (Tweet from January 28, 2012).

Very impressed w/ @F customer service line. Not hard to get live person online and then they are actually helpful! (Tweet from August 12, 2010).

If you want an example of great #customerservice look no further than @F – they get it. (Tweet from March 09, 2017).

Other positive comments show the relationship of exemplary service with the intention of reusing the service and customer loyalty:

I told @F that I forgot my access card at home, so they canceled my reservation with no penalty fees. Amazing support = loyal customer. (Tweet from May 10, 2012).

@A – thank you for having amazing customer service & for issuing me a credit! Will totally continue to utilize your service! #Austin. (Tweet from March 22, 2011).

In the complaints, the reports mention responsiveness problems, the delay in getting in touch with the company, or the lack of customer service and response in

official channels such as email and telephone, taking days or weeks to receive an answer.

@F your customer service phone wait time is abysmal. Twenty minutes on hold so far, and still going. This is awful for people who are often experiencing urgent issues (i.e. must speak to agent to resolve a reservation issue in real-time, standing next to the car)! (Tweet from November 19, 2019).

I had the same problem once... I had to open several complaints to resolve. (Tweet from August 31, 2018).

@E Terrible service. The last time I tried to use it, I was standing by the car for more than 1 hour and it didn't open. Bad service I do not recommend it (Tweet from August 31, 2018).

@C what is going on with your phone hotline pls? Been cut off 10x in a row over the last couple of days! And overcharged for my rental. (Tweet from June 26, 2019).

The negative comments classified the services as terrible and rude, mentioning the lack of proactivity ("we can't do anything") and the non-receptiveness to the users' improvement suggestions.

I had the same experience. Driver license check I had to interact with a rude (and I really mean "rude"! person) and first booking was the start of my worst invoicing experience ever. @D has billed the invoice amount multiple times from my CC and my account is blocked now (Tweet from July 30, 2020).

The organization and its employees are extremely unreceptive to suggestions aimed at improving things for users. The condescension in that regard is close to unbearable. (Tweet from May 27, 2016).

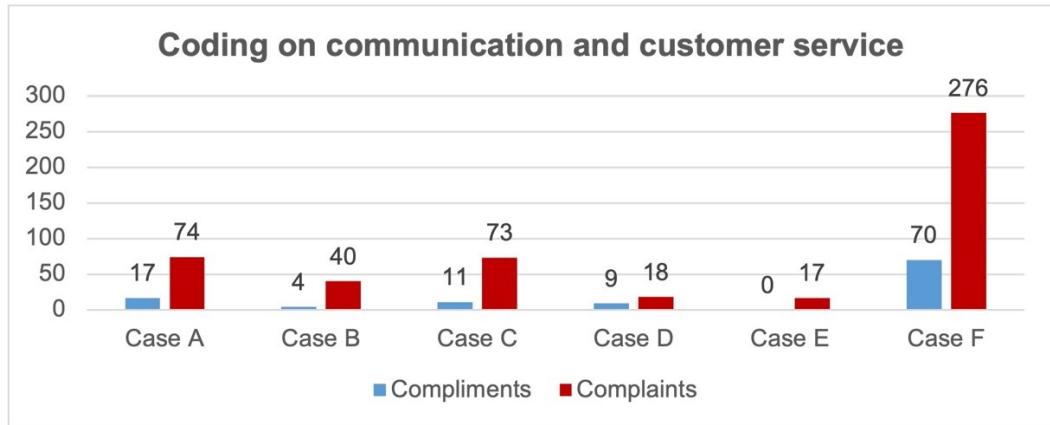
Finally, some comments still mention that they generally like the carsharing service, but the problem is customer service. If the user experiences any issue while using the service, the waiting time to resolve is too long. Some even mention that they are willing to pay more to use another company's service if the service is better.

Case B once again terrible customer service. Agents guessing no consideration for customers. First reply before opening account is sorry, we can do anything these are the rules!! So stuck on rules. No love. Guess time to try another car sharing service. (Tweet from May 18, 2018).

Good idea, horrific customer service. I'll gladly pay more to get better service from another company. Again, if you are without issue, F is great. However, if you have any issues... the nightmare begins. It's your call as to whether you want to take that chance. (Yelp review from December 24, 2014).

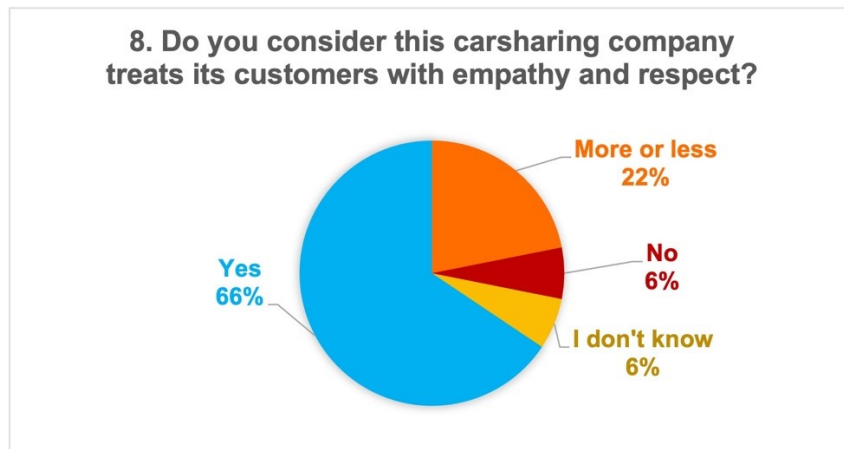
Chart 22 illustrates the 609 comments and reviews coded in this unit, ranked in compliments (111) and complaints (498). Chart 23, on the other hand, shows the total percentage of users' responses to the questionnaire.

Chart 22 – Distribution of coding on communication and customer service



Source: Own Authorship (2021).

Chart 23 – Total responses to the user questionnaire on empathy and customer service

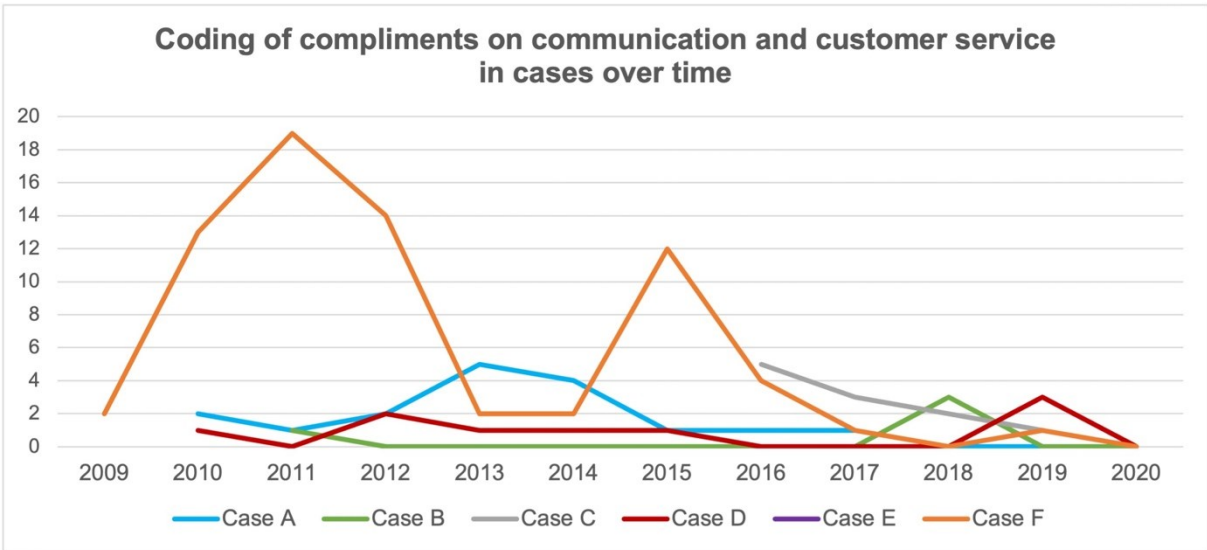


Source: Own Authorship (2021).

After analyzing the comments, we observed a much higher volume of complaints than compliments in all cases. However, in the responses to the user questionnaire, more than half of respondents (66%) consider that companies treat their customers with empathy and respect.

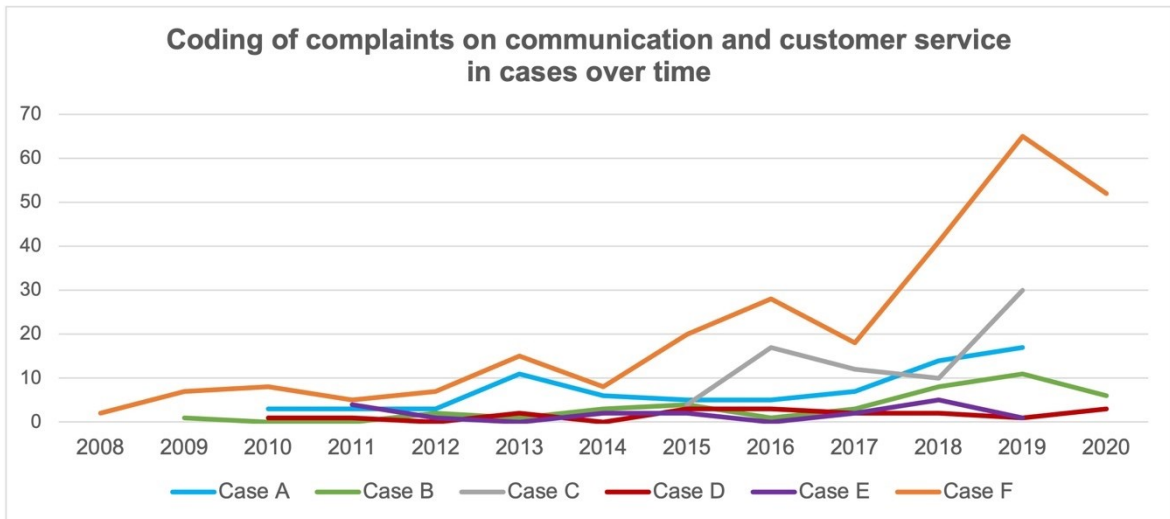
Also, in this unit, it is crucial to verify the evolution of reports on communication in cases over time. Chart 24 shows the distribution of the coded compliments over time, while Chart 25 shows the coded complaints from 2009 to 2020.

Chart 24 – Coding of compliments on communication and customer service in cases over time



Source: Own Authorship (2021).

Chart 25 – Coding of complaints on communication and customer service in cases over time



Source: Own Authorship (2021).

Observing the negative comments, it appears that there is a tendency, in almost all cases, for problems related to communication to increase with the service's operation period. This can be due both to the fact that companies are really having difficulties in providing adequate customer service, but also to the fact that users are more demanding about this aspect.

In case F, the company with the most complaints, this number increased from 2014 onwards. Before that period, the company had a peak of compliments, being even mentioned as an example of customer service by users. As of 2014, however, complaints have increased. During this same period, a large group of rental

companies acquired company F, and many users even pointed out this factor as a determinant in the drop in the quality of service provided and communication. Likewise, in the responses to the user questionnaire, case F, which had 276 of the comments of complaints about communication, only 38% considered the communication as positive, while 37% responded as more or less and 25% think that the company F does not treat its customers with empathy and respect.

Thus, it appears that the aspect of communication and customer service, whether related to empathy, courtesy, and the company's responsiveness, is a fundamental dimension in the users' perception of quality. Of all the units analyzed, this was the second with most complaints coded, which points to a widespread problem in all cases, both continuity, and interruption. In cases of interruption, there is an increase in complaints in the period closer to the end of the service. However, even cases of continuity also show this similar trend of increase in complaints.

In the users' comments and responses, we also found that users have divided opinions, as they like the service and want to continue being a customer, but when they need to solve a problem and get in touch with the company through a support channel, the customer service takes a long time and is awful. Thus, communication interferes with the user's perception of quality and impacts their satisfaction, contributing to their loyalty or giving up, as shown in the positive and negative examples. Hence, when people receive good service, they are happy; they recommend the service on social media and declare their intention to use it again.

Customer service is also directly related to user touchpoints while using the service, whether by direct communication with an employee by telephone or receiving an automatic email. These touchpoints are significant interactions, which help build and strengthen the relationship between provider and recipient, as pointed out by Stickdorn and Schneider (2010). Therefore, companies should identify the problematic touchpoints to look for ways to improve communication in these aspects, contributing to the propositions of Morton (2018).

Likewise, it is vital to think about continuous improvements and constant training of the employees and actors responsible for direct contact with customers, in order not only to understand the touchpoints but how this relationship happens, valuing empathy, respect, and seeking to solve the problem quickly, which reinforces the ideas of Parasuraman, Zeithaml, and Berry (1988) and Parasuraman, Zeithaml and Malhotra (2005).

Finally, we highlighted that, for many companies, social media could become one of the main channels of communication with customers, which is also pointed out by Wilhelms, Merfeld, and Henkel (2017). In the comments, there were cases in which the user received a faster response via Twitter than via the company's email or telephone. Although the company needs to be present in the most diverse communication channels, it must also understand which channels are used by its customers, not leaving aside the more conventional ways, such as telephone service. Telephone contact is still sought to resolve issues requiring more speed, such as searching for vehicles in the operation and coverage area.

4.3.2.6 Operation and coverage area

In this unit, we sought to verify the opinion of users about the operation and coverage area and the vehicles' availability in the cases studied. In reading the publications collected from Twitter and Yelp, we sought mentions to the vehicles' availability for use and reservations, the proximity to the points most used by users (Ampudia-Renuncio, Guirao, and Molina-Sanchez, 2018), and the distribution to serve the public in the operation area (Coxon, Napper, and Richardson, 2019; Reim, Parida, and Örtqvist, 2015).

Most of the comments identified as positive are related to the ease of finding vehicles close to places where users are in demand, such as home or work. Others show satisfaction in seeing the service expand to more areas or cities.

I do love that there are F cars parked all over the city so there is almost always one close to your home. For the most part I have had good luck with the cars running well too. (Yelp review from May 28, 2009).

@A had a great Launch in Hamburg today. You should check it out! Great concept and easy to use. (Tweet from April 06, 2011).

@A expands service areas in #Austin awesome! (Tweet from March 08, 2011).

We also identified many posts with requests to expand the service area, whether to increase the number of vehicles and stations in places where the company already operated or to offer the service in other cities or countries:

@E I know you're putting your cars near the stations..., but those who shop on Rua da Mooca are more on the upper perimeter. From paes de barro to marina crespi (sic) it would be interesting to call Rua Javari, Olimpio Portugal. (Tweet from January 12, 2019).

Wish @F was here in Winnipeg. In need of a car badly. (Tweet from January 21, 2012).

Any plans to bring your cars to Sacramento, CA? I know a lot of folks (myself included) who would use this service here! (Tweet from January 21, 2011).

In the reports that indicated complaints, users mentioned that the operation area seems to be decreasing. For example, a service that previously served certain city-regions now no longer provides vehicles in that location, and users can no longer find cars to use. Other reports say that despite companies announcing the expansion of their area of operation, they never have enough vehicles to meet the demand. Other users also comment on the lack of cars in strategic locations with high circulation, such as airports and train stations.

I would echo most of the other reviews here, F is a great concept, but has some teething troubles. The biggest problem is finding a car when you need it most. Especially in Cambridge, most of the cars seem booked out well in advance. F should plan to add more cars to their fleet. Other than that, this is a great cheap way of getting around, certainly cheaper than owning a car in this town! (Yelp review from May 29, 2006).

@F was my first ever #carshare membership, after I got rid of my personal vehicle in 2006. Sad to see them pull out of #Vancouver after using them for so many years. (Tweet from May 01, 2020).

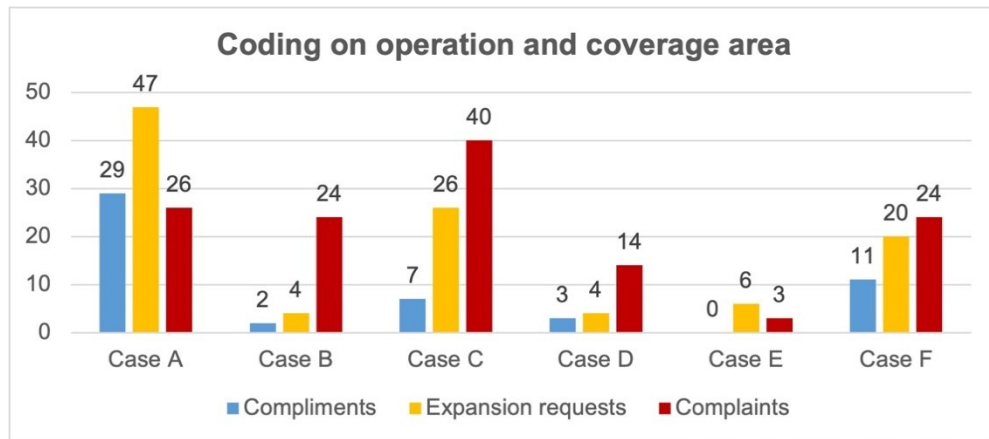
@A Cars need to equally distributed. No cars at all in the Hyde Park area. Really, the nearest car is close to UT campus. (Tweet from October 08, 2010).

@A there are never any cars in Vancouver!!!! #needmorecars. (Tweet from February 24, 2012).

Is anyone else in Seattle annoyed with the lack of @A cars? Love the idea but the cars are never around. (Tweet from December 27, 2013).

Chart 26 illustrates the distribution of the 290 comments coded in this unit, divided into compliments (52), expansion requests (107), and complaints (131). Although the number of complaints registered is higher, there are also many expansion requests.

Chart 26 – Distribution of coding on operation and coverage area



Source: Own Authorship (2021).

The coded numbers on the coverage area indicate the relevance of this dimension in the operation of carsharing services. To mitigate the problems related to this unit, two points stand out: (1) company actions to verify demand, both in the number of vehicles that must be made available and in the operation area and regular distribution of vehicles in this area; and (2) understanding by consumers about behavior changes and adapting to the shared use model.

Regarding the actions of carsharing service companies, they should pay attention to the number of vehicles available and the service coverage site, verifying whether they are meeting the largest area of demand, validating the statements of Mattia, Mugion and Principato (2019), Coxon, Napper and Richardson (2019) and Reim, Parida and Örtqvist (2015). Furthermore, the number of vehicles must be compatible with the number of users. The monitoring of this proportion must be constant, which reinforces the ideas of Ampudia-Renuncio, Guira, and Molina-Sanchez (2018).

Likewise, demand is related to the population density of the region served. For example, in central urban areas, with a higher concentration of inhabitants, several customers can use the same car sequentially, optimizing shared use. On the other hand, peripheral regions may present less demand, which is why it is more

challenging to offer B2C carsharing services in these locations, corroborating the perceptions of Lagadic, Verloes, and Louvet (2019). This was observed in the case of a company that ended its activities in certain cities and regions precisely because of the low demand and impossibility of maintaining the stations in specific points.

Another aspect is the proper distribution of vehicles in the operation area. In the comments, there was a case in which the company asked its customers to bring distant cars to the center, offering bonuses as a reward. The homogeneous distribution of vehicles is still an issue to be improved in providing these services, which is why it is crucial to invest in smart relocation strategies, as pointed out by Ampudia-Renuncio, Guirao, and Molina-Sanchez (2018). It is also essential to integrate the service's operating locations in the vicinity of other modes of transport, such as airports and railway stations, contributing to the ease of access, perceptions that corroborate the publications by Ferrero et al. (2018) and Mattia, Mugion and Principato (2019).

Thus, we understand that it is common to have complaints in this unit. The operation area and the number of vehicles are related to each company's business model strategy, which may have some limitations, both in the area it can serve and the number of cars it can make available. However, companies can monitor and mitigate some of the problems reported, mainly by adopting strategies to manage and control the number of users with the number of vehicles, watching the places with the most significant demand, and the intelligent distribution of cars.

Finally, we highlight that using carsharing services implies the adaptation of new consumption habits by users. The idea of shared use is precisely to allow more people to access the vehicle, optimizing its use. Therefore, contributing to Tukker (2004), consumers need to adapt to this new model of shared use, in which availability depends on the simultaneous use of the vehicle by others, being different from the full availability of their private car, but which can offer advantages over price.

4.3.2.7 Charges and prices

The objective of this unit was to identify users' perceptions about the prices charged for using the service. Therefore, we analyzed the publications collected from

Twitter and Yelp that mentioned aspects related to costs, charges, fees, and discounts, as pointed out by Möhlmann (2015) and Zhang, Gu, and Jahromi (2019). We also analyzed the responses to the users' questionnaire.

The compliments we found were related to prices considered fair and affordable, compared to other transport modes such as taxi, traditional rental, or ride-hailing services. Some comments also mentioned discounts and promotional packages, and some companies are recommended for not charging additional fees, such as membership fees or annual fees.

Keep working like that. And please don't take away the \$39 promo which I wasn't even warned about. Hug. (Tweet from September 05, 2018).

Just received my bill: always amazed at how affordable carsharing from B is, even for a long time!!! Thank you! (Tweet from June 22, 2012).

Every time I receive my invoice, I am amazed at how cheap @B is. (Tweet from August 24, 2012).

On the other hand, complaints mentioned several issues, such as excessive charges, excessive or not explicit fees at the time of the rental, constant rise in prices, problems with refunds or billing, and prices considered high.

They love to charge extra fees whenever they can. My biggest complaint (and the reason why I no longer take advantage of the \$34 overnight rate on weekdays), is that if you get stuck in traffic on the return to the city, and can't get the car into its spot on time, they will cancel your \$34 charge and bill you an hourly rate for the entire night. I was 25 minutes late once. I even called to tell them I was going to be late. I expected them to tack an extra half hour or hour charge onto my bill, but no. They changed the entire reservation and I ended up paying upwards of \$90 for the car. I called to complain and they told me to read the fine print. And yup, it's there. If the car isn't back on time, they charge regular rates for this promo. Wish I had known that before. (Yelp review from August 24, 2010).

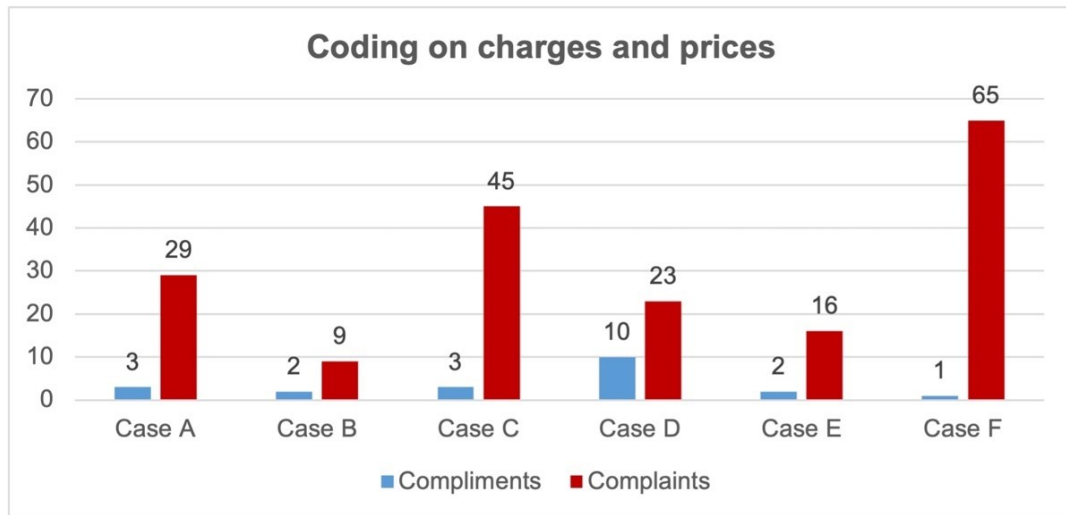
@F has charged my card 4 times in the last two days. My last ride with them was in September. They hung up on me when I questioned them on the phone. Check your credit cards people. I think this company might be a criminal front. (Tweet from January 03, 2020).

Hi, I rented a car today, but there were two transactions charged before I even started a rent, maybe you can check and explain? (Tweet from December 23, 2016).

@A this is a money grab. Definitely makes me less likely to use your service. (Tweet from May 01, 2015).

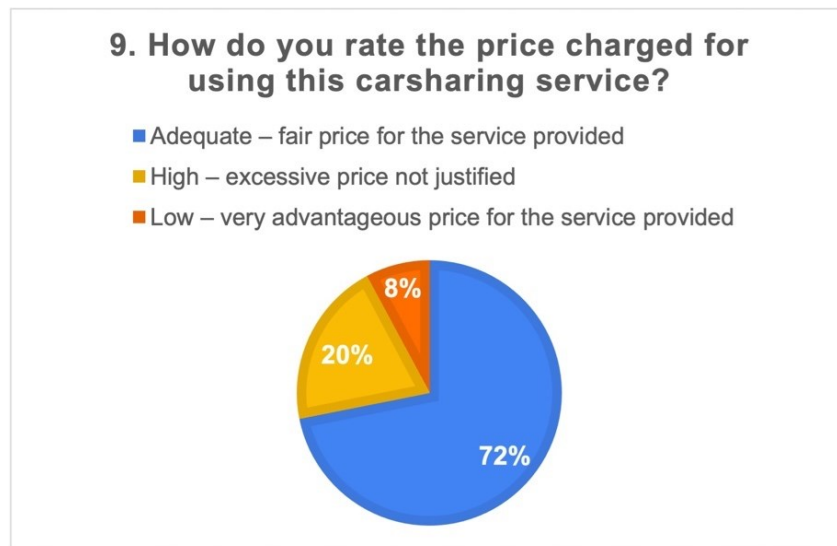
Chart 27 illustrates the distribution of the 208 comments coded on charges and prices, with 21 compliments and 187 complaints. Furthermore, Chart 28 shows the users' responses to the questionnaire.

Chart 27 – Distribution of coding on charges and prices



Source: Own Authorship (2021).

Chart 28 – Total responses to the user questionnaire on charges and prices



Source: Own Authorship (2021).

Comparing the collected comments with the responses to the questionnaire and analyzing this unit as a whole, despite complaints of high prices, we found that more than half of users consider the fees charged for service use as adequate due to the convenience provided by the service. In addition, not all complaints were about the price, but about problems related to excessive charges, fees charged without an

explanation, or changes in pricing policy and method of charging. Therefore, the company must clarify to its customer about the charging for service use. Furthermore, if there are additional fees, the company must explain why and when they are charged, as consumers look for companies with transparent pricing policies, an aspect also pointed out by Arcidiacono and Pais (2018).

On the other hand, although users criticize the fees charged for delays or misuse, in these cases, the company needs to have some way to penalize users for the inappropriate use of vehicles, as shared use depends on everyone's cooperation. Customers complain about punitive fees, but they are a way for the company to regulate shared use, with users returning vehicles on time to ensure the following user's reservation. If a consumer delays delivery, it can harm another who was waiting for the car to use it, which also generates dissatisfaction.

An alternative to avoid so many punitive tariffs for companies is to work with actions that encourage correct use and value continuous and loyal usage. For example, some companies have adopted strategies such as granting bonus minutes for usage if the customer returns on time and leaves the vehicle charging at the station. Corroborating the contributions of Arcidiacono and Pais (2018), rewards for frequent use can also be implemented, helping to retain customers, as there are cases in which customers change companies precisely because they disagree with the charging policy, and find competitors which they consider most advantageous.

Another complaint factor is the constant increase in prices, sometimes without justification, or changes in the charging methods. In this sense, the company needs to understand its target audience, like Zhang, Jahromi, and Kizildag (2018) suggested. In the comments, confirming the perceptions of Arcidiacono and Pais (2018), it is clear that users are looking for more flexible and personalized options, with usage charges and not fixed options for pre-defined packages. Likewise, consumers of shared mobility services are not necessarily looking for the lowest price but the most cost-effective options. This is exemplified in some reports, in which users claim that it is more advantageous to pay for the use of carsharing services only when necessary than to bear the ongoing costs of owning a car.

However, it appears that the Brazilian case study was an exception in this regard. In the reports of this case, there was an increase in complaints about the rise in prices from 2017. Many comments claimed that carsharing was not economically viable compared to other modes of transport, such as taxis, ride-hailing services, and

traditional car rental. In the cases of Europe and North America, carsharing services are seen as advantageous, both compared to other transport modes and compared to the expense of owning a private vehicle.

Thus, we note that price is an aspect that affects the general level of user satisfaction and is an essential factor in choosing a shared mobility service. Therefore, the company should consider pricing strategies based on value, considering that customers are willing to pay for the convenience and ease of service, but also flexible charges, aspects also observed by Zhang, Gu, and Jahromi (2019) and Murillo, Buckland, and Val (2017).

4.3.2.8 Flexibility

In this unit, the objective was to verify the user's perception of the service's flexibility. We observed the coded posts from Twitter and Yelp, and how the company makes this flexibility available to customers. This unit is related to the offer of different vehicle models and the versatility in booking and leasing, providing options that adapt to other user needs profiles, as Arcidiacono and Pais (2018) suggest.

We coded both comments of compliments and complaints. In the compliments, users mentioned the excellent range of vehicles, suitable for every need, the options for electric or hybrid cars and the flexibility to change or cancel reservations due to blizzards.

You guys are awesome! The way you handle your customer and go that extra mile and are flexible, that is just perfect! #HappyCustomer (Tweet from April 27, 2012).

Big news! @B to offer all-electric Nissan LEAF to clients in 2011! (Tweet from June 01, 2010).

@B To our members: no fees today to cancel a reservation less than 2 hours before the start time. Drive safely! #snowstorm (Tweet from February 02, 2011).

Some users mentioned the advantages compared to their private car, in which there is a limitation of a single model, while in carsharing, flexibility is in being able to choose the most suitable vehicle for each need.

I also love always having the right car for the job. For a trip to Home Depot or Ikea, I can take something SUVish – if I want to drive up to the North Shore and go to the beach and eat clams, I can take a Mini Convertible! (Yelp review from July 26, 2006).

There are lots of ways that @F is better than owning a real car, but only if you have a lifestyle that doesn't require a car daily, or even weekly, and you're conservative on cash. If you bought a car, you'd be stuck with one model, which still might not be big enough to bring home that loveseat you just bought, and which still might not be much fun on road trips. With @F, there's a variety of cars to choose from to meet your needs. And if you do end up buying a car after your membership, you'll have experienced more types of cars and be in a better position to choose just one. Plus, there's all the savings on gas, parking, insurance, car payments, repairs, and to the environment that you get when you pick F over owning a car that you don't use daily. (Yelp review from November 24, 2007).

Complaints mentioned the few vehicle options, the lack of more suitable options for each need, such as child seats, which are only available in some cities, or the lack of support for those who need to transport a bicycle. We also noticed mentions of problems in using some vehicle models, such as electric ones, offered in fewer numbers and rarely available. Other comments mention that it is not possible to choose the vehicle to be used or the inflexibility of not making changes to the reservation. Some companies also have an age limit for renting some models, only allowing customers older than 25 years.

Hello;) I would like to change the vehicle from one booking to a larger one. But I only see the possibility to change the time. Can't I upgrade? (Tweet from February 27, 2018).

Do you have a car with a bicycle rack? (Tweet from April 16, 2013).

Make your fleet more versatile. A single (oversized) 9-seater for Berlin is not enough. (Tweet from August 27, 2017).

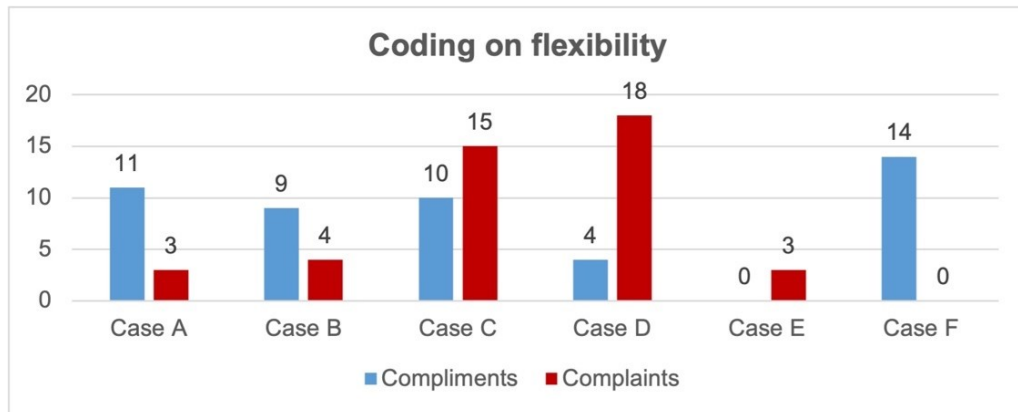
Not that, but usage basis for me. Termination then takes place at reg. Time. It's a shame you're so inflexible. (Tweet from April 13, 2015).

Since when do I have to be 25 years old to rent an A class with @A in Berlin? What a terrible experience to be excluded from a service you frequently used for years. (Tweet from October 02, 2019).

Chart 29 illustrates the distribution of the 91 comments coded in this unit, with 48 compliments and 43 complaints. The companies that presented the most compliments were those with a more diversified fleet, with hybrid and electric models and in various sizes (compacts, SUVs, vans), or with more flexible options in the use

of the service. Those with more complaints are more inflexible when choosing vehicles or changing the reservation.

Chart 29 – Distribution of coding on flexibility



Source: Own Authorship (2021).

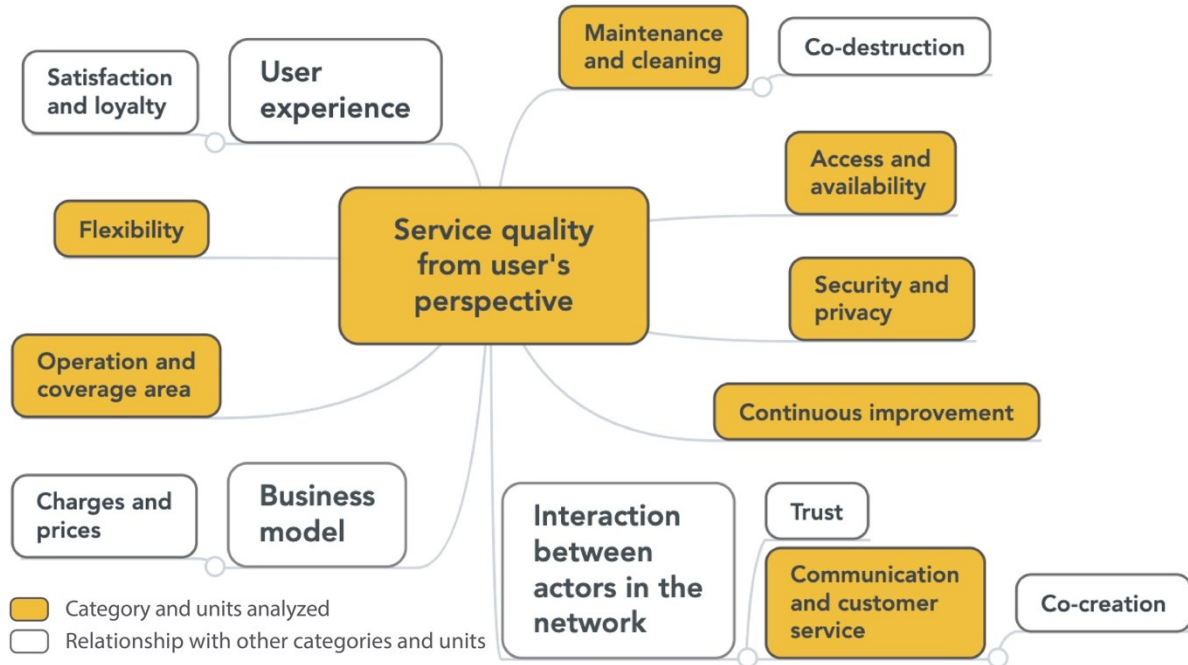
Thus, we understand that flexibility is an important dimension to be considered by companies providing carsharing services. Flexibility is related to the practicality and convenience of using these services, which was also observed by Zhang, Gu, and Jahromi (2019), making consumers prefer the most adaptable and appropriate service for their different needs, reinforcing the ideas by Wielinski, Trépanier, and Morency (2017). In the comments, it was possible to verify that users compare companies, particularly when several services are operating in their city. Hence, they end up comparing and complaining about inflexible cases with more flexible companies. Therefore, reaffirming the propositions of Arcidiacono and Pais (2018), to serve a broader audience, these services must follow the different user profiles and their use situations.

Companies should also seek to provide, when possible, special equipment such as child seats and bicycle racks, an aspect also pointed out by Arcidiacono and Pais (2018). In this sense, the integration of carsharing with other transport modes is also essential. If carsharing does not present advantages and certain flexibility, the user may end up resorting to their private car, as they find it more comfortable and safer. However, efficient integration of various mobility services has the potential to compete with the flexibility and convenience of private cars, allowing for comfortable and more economical travel. This observation contributes to what was proposed by Miramontes et al., (2017).

4.3.2.9 Synthesis of the Service Quality from User’s Perspective Category

After analyzing each of the registration units in this category separately, we realized how they are all related to the users' perception of the quality of the service provided. Figure 33 shows the distribution of the eight units analyzed in this category, according to their relationship with the Service Quality from User’s Perspective Analysis Category, and the relationship of this category and its units with the other categories and units from the conceptual-theoretical model.

Figure 33 – Summary of the Quality category and its relationship with other categories



Source: Own Authorship (2021).

Therefore, we consider that all aspects of the analyzed units must be monitored to maintain the service operation quality. Moreover, we also noticed that there is a direct relationship between the Service quality from the user’s perspective category with the User experience category, as aspects of the service’s operation impact the user journey, satisfaction, and loyalty intention.

Furthermore, it is possible to notice the relationship of this category units with other analysis categories, such as the category of Interaction between actors in the network. In this sense, the communication and customer service registration unit, despite being related to the service quality, as customers seek to contact the company to report and solve problems, also involves value co-creation, in which the

customers come to the company with improvement suggestions. Thus, we verified the importance of the communication unit, with a concern for integration with the other actors who provide the service, since it involves the relationship between all suppliers, support providers, support, and maintenance companies of the service's solution-demand network.

Similarly, we observed a relationship between other registration units from the Interaction between actors in the network and Service Quality categories. Among them, we highlight trust issues, especially in billing problems, which are often not transparent to users, and in maintenance and cleaning, which involves both the responsibility of the company, but also the co-destruction resulting from shared use with other users.

Finally, we identified a relationship between the Service Quality category with the registration units of the Business Model category. The operation and coverage area registration unit, for example, is related to the strategy defined by companies regarding the reach in which they can operate and the capacity of vehicles they manage to make available. The flexibility and charges and prices units, on the other hand, are related to the target audience expected to be served, adapting the business model solution to the network's demand, or identifying the demand to design the solution.

Therefore, these first two categories we analyzed, of User experience and Service quality from user's perception, had a greater focus on the relationship between provider and consumer, despite also considering the integration of all actors in the solution-demand network. In the following analysis categories, we find that the relationship with other actors is more noticeable.

4.3.3 Analysis Category of Sharing Economy Business Model

The third analysis category considers the business model of shared mobility services. In this category, we analyzed the following registration units: offer or value proposition, operating model, financial model, customer segments, forms of customer relationship, partner networks, and compliance with legislation.

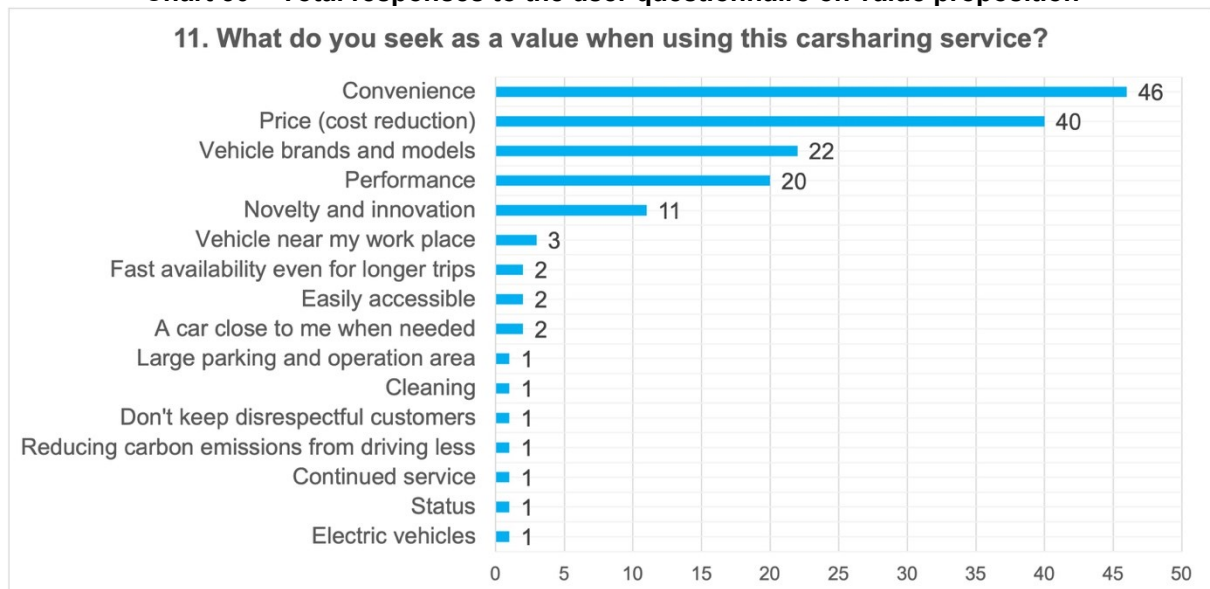
4.3.3.1 Offer or value proposition

This unit of the Business Model category aimed to verify the actors' perception of the value expected and delivered by the carsharing service from the point of view of users, city halls, and companies. Therefore, we analyzed the responses to the respective questionnaires and the encodings of the collected comments.

In the users' question, we listed value propositions that carsharing services offer and allowed users to add their options if they wished. Users could also select more than one option for this question, as customers often look for different value propositions when using carsharing services.

Considering all the responding users, without separating them by services used, we found that convenience is the most sought-after aspect as a value when using carsharing (Chart 30). Other relevant items are price or cost reduction, vehicle brands and models, performance, and novelty or innovation. Most of the other items, which appeared in smaller quantities, are related to convenience, such as: being easily accessible or having a car nearby.

Chart 30 – Total responses to the user questionnaire on value proposition



Source: Own Authorship (2021).

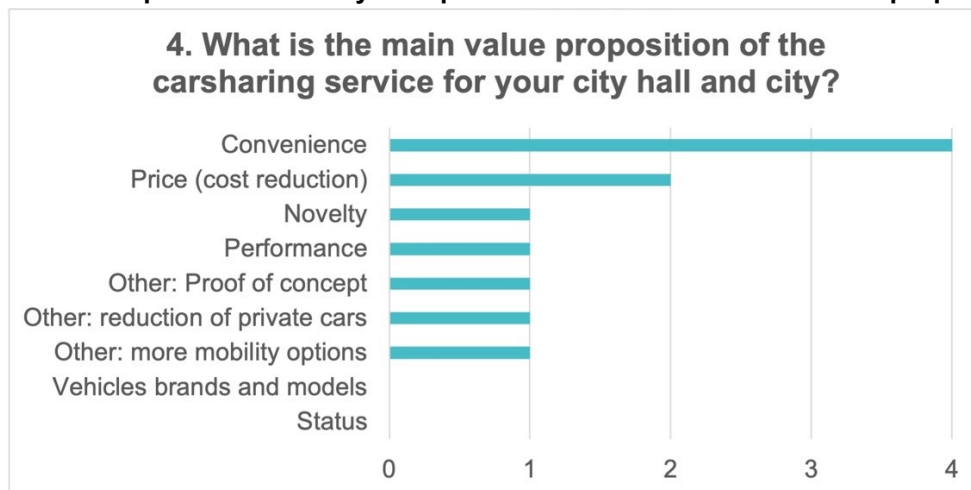
Thus, we understand that convenience is the primary offer or value proposition that users receive and seek. It is related to ease and comfort that the

customer perceives as cost-effective. This convenience is mainly perceived as a functional value since carsharing already has exclusive parking spaces, and the user does not have to worry about maintenance or insurance, and fuel expenses.

We also verified that despite being in second place, the price is not necessarily the most relevant item, as many users are willing to pay for the best cost-benefit of convenience and practicality. Therefore, these consumer responses confirm what Murillo, Buckland, and Val (2017) proposed: price, convenience, and brand are the three most significant factors when choosing a collaborative economy option.

In the responses from city halls, we found that convenience was also the item most mentioned by all respondents (Chart 31). Two respondents also considered price or cost reduction. The other aspects were deemed to be relevant by only one of the city halls. However, here we pay attention to the other answered options, which show the city halls' viewpoint on carsharing services in the urban territory, such as the possibility of reducing private car use, more travel options for citizens, and the opportunity for testing services to serve as proof of concept in cities.

Chart 31 – Responses to the city hall questionnaire about offer and value proposition

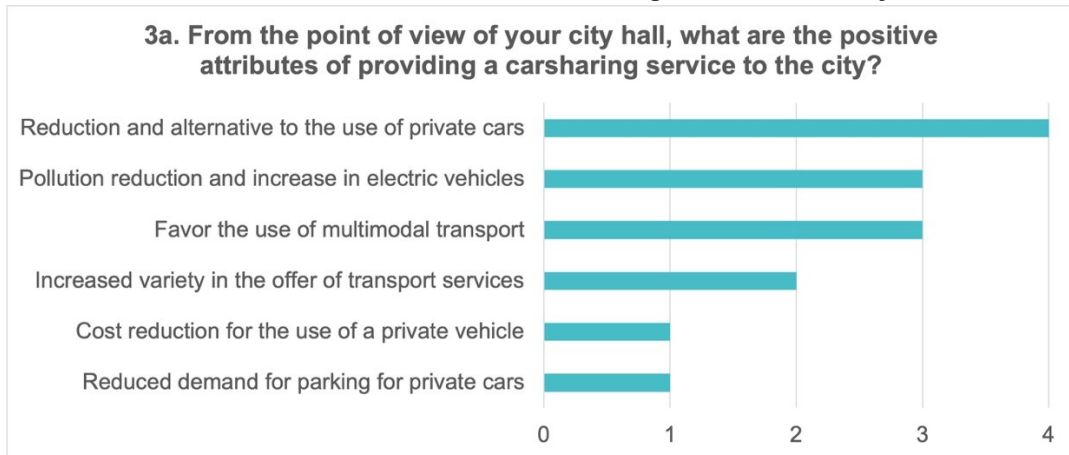


Source: Own Authorship (2021).

City halls also responded with what they consider to be the positive and negative aspects of carsharing services for their cities. On the positive attributes (Chart 32), all city halls mentioned the relationship between carsharing services as an alternative and the possibility of reducing private cars circulation. They also noted the pollution decrease due to the increase in electric vehicles and the encouragement for multimodal transport. Other less commented items, however,

related to those already mentioned, were the increase in the variety of transportation alternatives and the reduction in parking demand, which can improve urban mobility, as also pointed out by Ferrero et al. (2018).

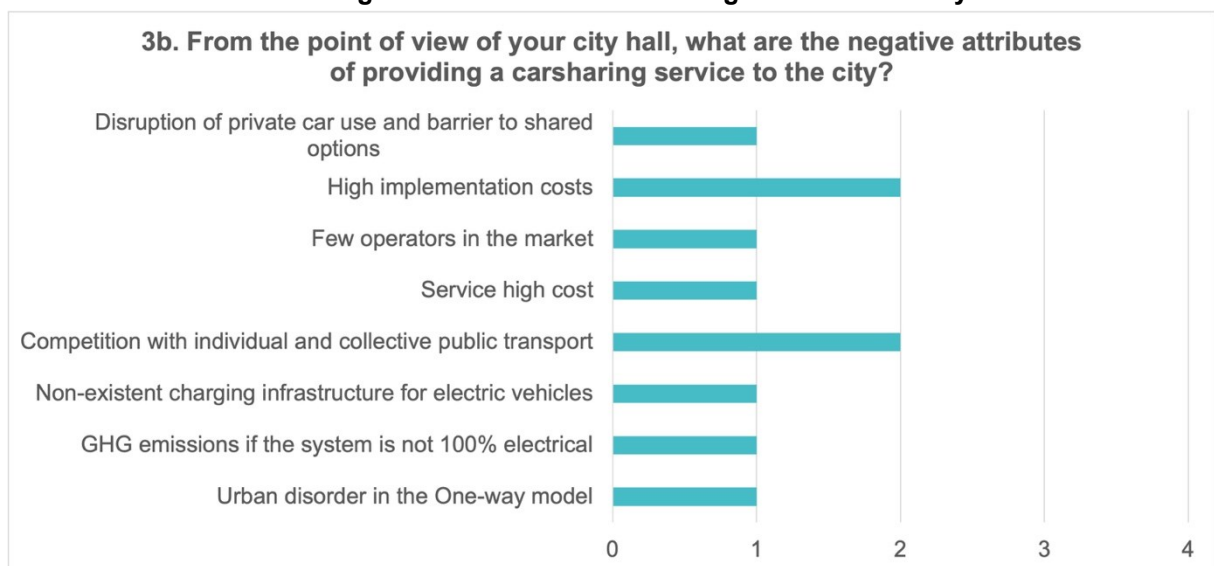
Chart 32 – Positive attributes of carsharing in the view of city halls



Source: Own Authorship (2021).

Regarding the negative attributes (Chart 33), the city halls mentioned the high costs of implementing these services, in addition to competition with other modes, which may disadvantage the use of public transport due to easier access to individual vehicles, even if shared. Other negative points were the difficulties in breaking away from using a private car to the use of shared options, few operators present in the market, and challenges related to the use of electric vehicles, such as the lack of infrastructure in the city and concerns about urban mobility.

Chart 33 – Negative attributes of carsharing in the view of city halls



Source: Own Authorship (2021).

Regarding carsharing companies, we researched for information on what they propose as value, mainly in the sale and dissemination of their services, on their websites, and on their social networks. In all studied cases, we found that convenience is the most publicized aspect of attracting customers and distinguishing the company from its competitors, corroborating Osterwalder and Pigneur (2010). In this sense, convenience has a closer relationship with the interests of users.

Some companies also consider in their value proposition the interests of other actors, such as city halls. In this sense, there is a concern about carsharing use integrated with other means of transport and environmental impacts by reducing private vehicles and promoting electric cars. On the other hand, co-destruction problems, such as damaged or wrongly parked vehicles, have the opposite effect, harming the urban territory and bringing losses to the city hall and citizens.

Therefore, we understand that although users are the main interested in using carsharing services and the primary target audience, the value proposition of carsharing companies must consider all actors in the network, corroborating what was proposed by Griger and Ludwig (2018).

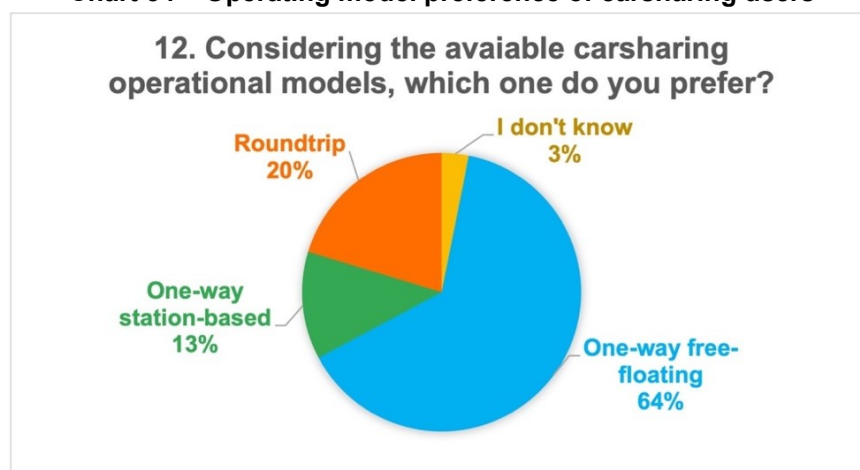
Furthermore, these aspects, both positive and negative, can be related to the idea of *interessement* from the Actor-Network Theory, addressed by authors such as Callon (1986) and Lackzo et al. (2019), consisting of favorable or unfavorable aspects for the *interessement* of actors as part of the solution-demand network of shared mobility services. Suppose an actor does not share the value proposition or perceives more negative than positive aspects. In that case, they may no longer want to continue to be part of the network, consequently interfering with other actors. That is why the company needs to communicate its service's value proposition clearly and understand the interests of different actors, as durability depends on monitoring these relationships and creating new connections between them. Contributing to the ideas of Baraldi et al. (2019), we understand that networks are dynamic and develop over time. Therefore, the company needs to follow the market, its changes, and adaptations, including the operating model of the provided carsharing service.

4.3.3.2 Operating model

The second registration unit of the Business Model category sought to verify the actors' perception and preference about each company's operating model. Thus, we analyzed the responses to the questionnaires from users and city halls. From the companies' point of view, we observed the trajectory and changes in the models offered in each case throughout their operation period.

Both users and city halls (Charts 34 and 35) preferred the one-way free-floating model. From the perspective of consumers who use the service, it is the operating model that offers more flexibility and convenience, especially for short journeys without reservation (Ampudia-Renuncio, Guirao, and Molina-Sanchez, 2018). In addition, when reading the online comments, many of the customers' suggestions for improvement included asking for more flexible ways to pick up and return vehicles. However, despite being much more practical for customers, one of the main obstacles for the free-floating model is the balanced distribution of cars in the service operation area, an aspect also pointed out by Shaheen, Chan, and Micheaux (2015). Hence, users are dissatisfied when they do not find nearby vehicles, highlighting how shared mobility services still have challenges in their operation, maintenance, and logistics.

Chart 34 – Operating model preference of carsharing users

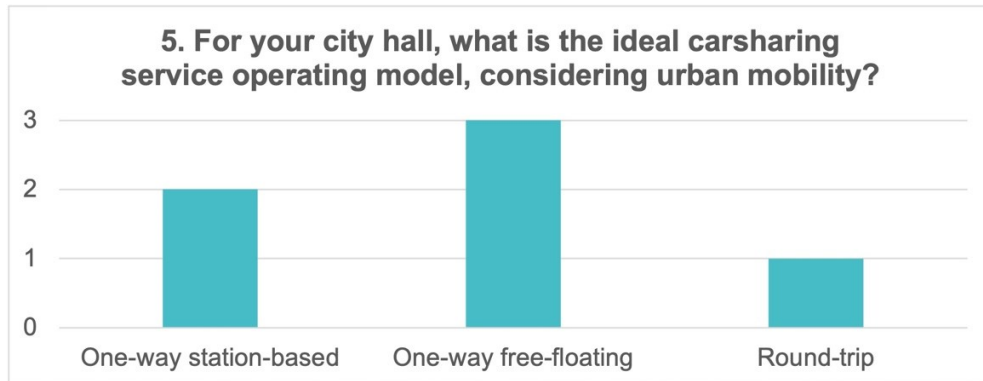


Source: Own Authorship (2021).

Considering the perspective of city halls, there are also some advantages of the one-way free-floating model for cities, such as using the rotating spaces already available by the city without needing to install other exclusive areas. However, free-

floating models can also negatively affect urban mobility due to the concentration of many carsharing vehicles in one location, resulting in the lack of parking spaces for other vehicles. Therefore, the round-trip model could be the most suitable, as the car would already have a specific pick-up and return location, but it would also have an idle parking space while the vehicle is in use.

Chart 35 – Carsharing operating model preference of city halls



Source: Own Authorship (2021).

Finally, from the companies' perspective, each operating model has its advantages and challenges. For example, the round-trip option is apparently the easiest to manage, facilitating the inspection of reservations and delays. If the vehicle is not in circulation, it should be parked in its specific spot. However, this model does not suit users who need more flexible sharing options. Thus, the one-way models, despite allowing an expansion of service performance, can result in a more complex logistics of follow-up, requiring a balanced distribution of vehicles, in addition to the difficulty in inspecting any damage.

Of the six case studies, we found that companies B and D started with the round-trip model and began implementing tests of the other models. In contrast, other companies maintained only one operating model in their trajectory, as in case E. Of the companies that are still in operation, we observed that all, at some point, started to offer both the round-trip option and more flexible options of the one-way model, with different costs between them, allowing the user to choose which is the most suitable for their need. Thus, we understand that it is not the use of a specific operating model that can guarantee the continuity or interruption of a carsharing service. What seems more relevant is the company's adaptive capacity to keep up with changes in the scenario and test new solutions to adapt to its demand.

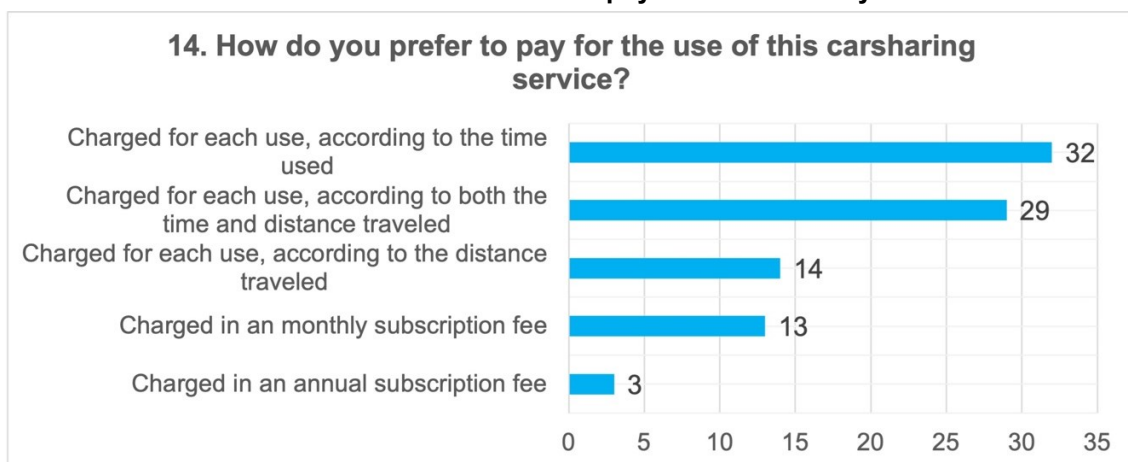
Furthermore, it is essential to offer flexible alternatives to consumers, also in the financial model.

4.3.3.3 Financial model

The objective of this unit was to verify the financial model of each case studied and which are the users' preferences when paying for service use. We consulted the users through the questionnaire and accessed the companies' websites to consult their main charging methods.

We observed that consumers' preference for payment methods is based on the rental time, distance covered, or a combination of both. Charges through monthly or annual subscriptions were less preferred (Chart 36).

Chart 36 – Preference of service payment methods by users



Source: Own Authorship (2021).

These responses highlight consumer preference for flexible payment options – by the rental time, distance, or a combination of these. As shown in the Charges and prices unit in the Quality category, most respondents consider prices fair due to the convenience and all the benefits that the service provides. Dissatisfaction was more related to excessive rates, constant price increases, and limited package options. This shows that consumers can influence pricing strategies, which was also observed by Zhang, Jahromi, and Kizildag (2018), pushing for a more customizable pricing model that can enhance and reward those who use it most frequently. Therefore, customers prefer to pay only when the service is actually used. Another

problem with pre-defined packages is that users need to predict the usage time when choosing the package, and if they exceed the contracted time, they pay a much higher amount for the extra time.

In the comments we analyzed, dissatisfaction was mentioned when some companies restricted their payment options, eliminating the more flexible billing options and leaving few alternatives. On the other hand, other cases started to offer more billing options, such as flex, which provide more flexibility and can be chosen as needed. However, a remarkable aspect is that the pricing policy should be clear to customers, and all additional fees must be plainly stated.

We also understand that from the companies' perspective and the viability of its business model, subscriptions have more financial guarantees than payment peruse, which does not guarantee customer return. In addition, the annual fees are used to ensure the maintenance of the member's subscription. Therefore, it is not always possible to consider only the users' opinions, but also what is more viable in the long term for the business, as pointed out by Osterwalder and Pigneur (2010). Anyway, carsharing users tend to prefer more flexible options, whether in the use of vehicles, the models available, and the payment methods, so companies should understand their target audience and segment of customers.

4.3.3.4 Customer segments

This unit analyzed the customer segment for which companies provide value (Osterwalder and Pigneur, 2010). As presented in the Theoretical Background chapter, carsharing services can be delivered to three different audiences: business-to-consumer (B2C), business-to-business (B2B), or peer-to-peer (P2P) (Lagadic, Verloes, and Louvet, 2019).

When selecting the case studies, we delimited only carsharing services focused on the B2C public. However, we found that some of the companies, over their operation period, began to adapt their solutions also to include other audiences. For example, case F provides a B2B carsharing in England, and company B offers a P2P option, making its sharing platform available to people who want to share their private car. Another example is company E, in Brazil, which offered discount options

and partnerships for drivers of ride-hailing applications such as Uber. Although this company ended its B2C sharing service, the business migrated to an opportunity to offer its technology solution to the B2B market.

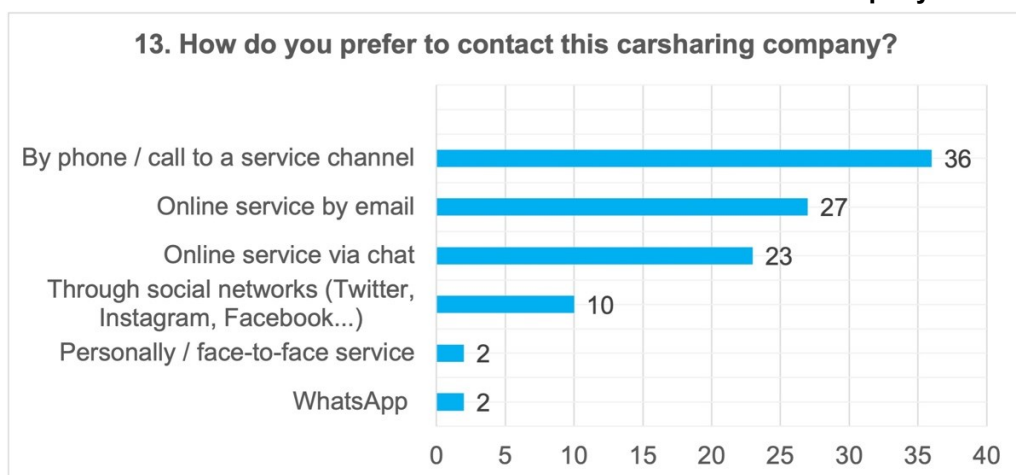
Thus, corroborating the contributions of Zhang, Jahromi, and Kizildag (2018), we understand the relevance of this unit as part of the business model strategy, which consists of defining, researching, and knowing the profile of the target audience, following market changes, and adapting its solution to new demands. Therefore, one of the main ways to understand and create proximity with the customer segment is through different relationship strategies with the consumer.

4.4.3.5 Forms of customer relationship

In this unit, we identified the primary forms of relationships between companies and their customers, and which were preferred by customers. We surveyed the different relationship channels mentioned in the collected comments and searched on the companies' websites.

Users' preference was consulted in the questionnaire, where respondents could inform more than one option. Of all the answers (Chart 37), the preference was for contact via telephone or calling a service channel. Online service via email or chat was also more preferred. Contact through social networks was less mentioned, as well as face-to-face service.

Chart 37 – Preference of user contact channels with the company



Source: Own Authorship (2021).

Therefore, we realize that most consumers prefer forms of relationship that are closer to the companies. Although they do not indicate personal contact, the preference for telephone contact represents the search for more immediate service and usually the intention to talk to an actual employee, not an automated center operated by a non-human service. This points to a lack of symmetry between human and non-human actors, as pointed out by Callon (1986) and Latour (1996), demonstrating a preference for customer service from human actors.

Many respondents also indicated online customer service channels, indicating another profile that allows faster and more practical ways to avoid waiting on the phone. However, in the comments, we found that contact by email is often slow, taking a long time for the customer to receive a response. In these cases, social networks were the only channel to draw the company's attention and get some more immediate response.

Therefore, we realize, confirming the propositions of Stickdorn and Schneider (2010), that this unit has great relevance for users, as it is one of the primary ways the company maintains its relationship with customers. More than a form of communication and customer service, these forms of relationship consist of touchpoints that can develop and strengthen the proximity of service providers to their customers, helping the customer to feel supported, safe, and confident in the various aspects of the service and the provider company.

We also highlight the importance of companies providing different forms of relationship with their consumers to meet several profiles – those who prefer more direct contact and those who are more used to online channels. Although automated and online channels speed up communication, due to the large volume of customers, the customer feels more secure in talking directly to a human actor in some situations. In any case, we understand that there is an increasing relevance of social networks, especially for businesses in the technology segment, in becoming one of the main communication channels to connect with customers, especially the younger generations, strengthening the ideas of Casprini, Minin, and Paraboschi (2019).

The forms of customer relationships also interfere with the relationship with other actors that are part of the carsharing services solution-demand network. To provide a quality service to their consumers, companies depend on partnerships with different actors to supply various activities related to the service provision.

4.3.3.6 Partner network

This unit aimed to analyze the formation of partnerships between carsharing service companies and the different actors in the network.

We identified four distinct types of partnerships:

- 1) Partnerships, incorporation, or acquisition of other carsharing companies in the service operation to expand the business, especially to other countries or country regions.
- 2) Partnerships or acquisitions by automakers or rental companies to supply vehicles or increase the company's contribution.
- 3) Partnerships with other mobility modes and services, such as bike-sharing and ride-hailing (Uber) services, train, and bus systems, to encourage the integrated use of various means of transportation.
- 4) Public-private partnerships with city halls.

It is relevant to identify these different types of partnerships as it demonstrates the importance of creating a network formed by various actors to meet the specific needs that companies cannot execute independently, reaffirming Reim, Parida, and Örtqvist (2015). Therefore, recalling Stabauer (2018), it is vital to build a solid partner network and seek to connect new participants or reconnect existing partners in new ways. The service durability depends on monitoring these relationships and creating new connections between them, reflecting on the network development over time, reiterating the ideas proposed by Baraldi et al. (2019).

By analyzing the various partnerships formed in the cases studied, there is an indication that companies that sought to create more strategic partnerships were more successful in the operation of their mobility services. For example, in cases of continuity (B, D, and F), this is seen both in the operating time, which already exceeds ten years, and in the expansion of operation areas. The various partnerships allowed the expansion of services to other regions and countries, increasing the number of clients served. In cases of interruption, such as company E, no partnerships were formed with the city hall or other companies, so the offer of the B2C service was interrupted to change the segment of customers served. Despite having also formed several partnerships, Cases A and C did not have their services

in operation for so long. However, they ended up creating a new service by merging the two companies.

Regarding public-private partnerships, of the four city halls that answered the questionnaire, three agree that their city hall is seen as a partner in the carsharing service. The only one that did not consider itself a partner was the same city hall that stated that there are no actions that promote this partnership with the carsharing services in operation in the city. Among the leading measures of these public-private partnerships are financial or tax incentives and benefits and exemptions in the service operation in cities, such as parking fees or allowance to electric vehicles circulation.

4.3.3.7 Compliance with legislation and incentives

The last registration unit in the Business Model category is related to the adequacy of carsharing companies to the legislation, verifying if the company follows the local laws in force, and identifying if there are agreements with the city hall for the service operation. For this, users and city halls were consulted through questionnaires.

In the users' perception, more than 80% consider that carsharing companies are concerned with following the local laws in force (Chart 38). Although we coded several comments that mentioned cars parked irregularly in prohibited places, intersections, or sidewalks, these have more to do with the value co-destruction caused by the users themselves. However, companies are often unable to inspect and monitor these irregularities properly. When this happens, the company is fined by traffic agents, and the last customer who used the vehicle found in the wrong location is taxed.

Chart 38 – Users' perception of carsharing companies' concern with the legislation



Source: Own Authorship (2021).

Regarding city halls, when asked about incentives and partnerships to operate carsharing in their city, 3 out of 4 responded that there are formed partnerships. The main benefits are financial balance, tax benefits, availability, and charges exemption in public parking spaces for rotating electric vehicles.

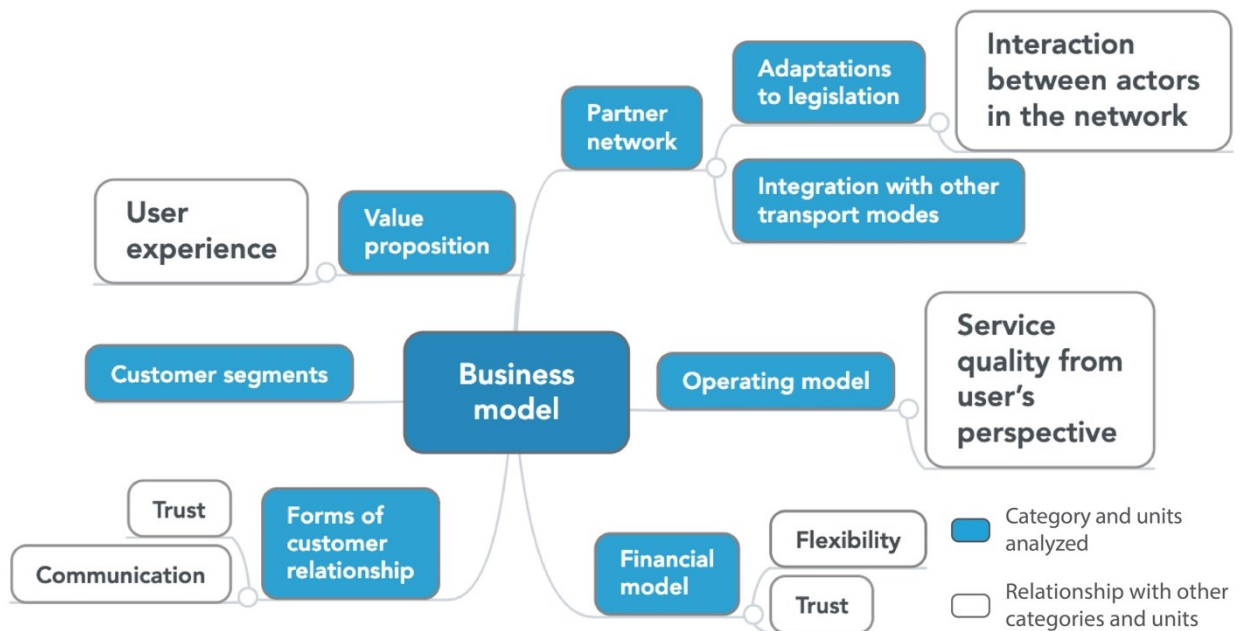
So, in almost all the cases studied, the carsharing companies developed partnership agreements with city halls to facilitate the service operation in their cities. These partnerships are essential to align carsharing services with local regulations and establish agreements that guarantee companies operating conditions in the use of public spaces and parking, differentiated taxation, and other benefits (Perboli et al., 2018). But, on the other hand, there should be a balance in granting these incentives without generating losses for the other inhabitants of the city. Thus, companies and local authorities must work together in inspection to ensure the correct use of the urban territory.

Concerning parking spaces, carsharing space is not just for the financial benefit of private businesses, but for the entire community and local population that can enjoy the associated benefits. Just as carsharing blends individuals with collaborative practices, parking is shared through subtle redefinitions of public and private, as Dowling and Kent (2015) pointed out. Therefore, once again, we identify the importance of creating partnerships between private and public actors in carsharing business models.

4.3.3.8 Synthesis of the Sharing Economy Business Model Category

The business model of a carsharing service is a strategic aspect of high relevance, both for the moment of conception and for the implementation and operation maintenance. Thus, we understand that this analysis category defines the company's strategy to offer a set of shared mobility solutions through a service. In addition, these solutions must provide a good user experience due to customer satisfaction and loyalty and contribute to value co-creation for the different actors in the network. Figure 34 summarizes the relationship between the registration units analyzed in this category and their relationship with the other categories and registration units.

Figure 34 – Summary of the Business model category and its relationship with other categories



Source: Own Authorship (2021).

From the users' perspective, the set of elements of a service's business model can contribute to their decision to adhere to the service. For example, suppose they have the option to choose. In that case, users look for the service that offers them the best conditions, involving value proposition, which interferes with their experience, flexibility in charging options, the models and brands of vehicles available, and the different options of the operating model, aspects that interfere with

their perception of quality of access and use. In addition, customers look for the company's reliability in communication through its customer service channels, customer relationship, and a transparent financial model.

From the companies' perspective, understanding their customers' profiles contributes to their strategies for defining the value proposition, operating and financial models, and the best forms of customer relationship. In addition, the definition of the operation area is also a definition of the company's strategy to delimit the zone in which they can provide the service and the number of cars that will be made available for shared use. Finally, the business model contributes to partnership formation strategies in searching for different public and private actors to meet the varied needs and expand their operations.

We observed that the continuity cases sought to form new partnerships, introduced tests, and changes in their operating model, charging methods, customer relationship channels, and even changes in the target audience.

We emphasize, therefore, that the business model is not a static structure that is defined only at the time of service creation. On the contrary, the relevance of the business model lies in the company's ability to adapt and evolve, in keeping up with the necessary changes in its business, and in the formation of the solution-demand network for the carsharing service, in the identification of all the relevant actors that should take part and interact in this network.

4.3.4 Analysis Category of Actants of Shared Mobility Services Network

The fourth analysis category comprises the main actants identified as participants in the shared mobility services operation network, namely: users, carsharing companies, support companies, suppliers and manufacturers, infrastructure, and ecosystem (non-human actors), government and local authorities, and citizens (society). We identified these actants from the analysis of the collected data.

4.3.4.1 Users

This unit aimed to identify the users' profile of the analyzed companies through publications collected on Twitter and Yelp. In reading these comments, we sought elements that indicated the user's profile and behavior concerning the use of carsharing services, such as mentioning other means of transport, the frequency of use of the service, and whether they still depend on the use of their own car (Arcidiacono and Pais, 2018; Heinonen and Strandvik, 2018; Vij, 2019).

We found that users from companies A, B, C, D, and F mentioned the use of different means of transport, such as bicycles, subways, trains, buses, displacements on foot, by taxi, use of ride-hailing services (Uber), and carsharing services, which were used as needed. In addition, in about 40 comments, users stated that they no longer have a private car or have sold their second car since they started using carsharing. Many of the consumers in case F are university students due to the partnerships that this company makes with the institutions' campuses, which are places with a high demand for mobility for this audience. Therefore, we observe a pattern in the users' profile of these mentioned cases. Most are residents of denser and central areas of cities in Europe and North America. Many still have their own vehicle that different family members can use, but they use it combined with other transport modes, as noted by Arcidiacono and Pais (2018) and Vij (2019).

In case E, a company located in Brazil, we observed different customer behavior. Several user profiles were identified, such as those who use the service wishing to contribute to the cause of sustainability and collaborative consumption, those who are only interested in promotional packages and discount coupons, and those who sympathize with the idea of the service, but did not use it, just shared information on social networks. Furthermore, the company's E service was offered in a large Brazilian capital, which has a vehicle rotation system, precisely because of the high quantity in circulation. Thus, carsharing in this city served as an alternative to driving a private car on days when users could not use their own vehicle, reinforcing the dependence on this means of transport in this country.

Thus, in Brazil, the idea of using carsharing services to complement the existing transport structure is still at a very early stage. There is a significant dependence on private cars, both for safety (physical and financial) and for

convenience. In addition, there are still few carsharing services available, many in the process of implementation and testing phases, with few vehicles in operation, and many problems related to access, which makes it difficult for Brazilian users to trust this type of service entirely. In addition, the integration between modes happens sporadically, without incentives to use different means of transport. Finally, the costs of using carsharing services are still high for most Brazilian consumers, so they choose other considered more economical.

Corroborating the propositions of Sopjani et al. (2019), consumers are relevant actors in the shared mobility services network and can determine changes for suppliers and manufacturers. Hence, it is crucial that carsharing companies holistically understand the profile and niches of their audience to design solutions that are compatible with the demands. Currently, consumers have more and more options and autonomy to choose, and are looking for the most flexible alternatives that meet their varied needs. Therefore, they decide on the option that seems most advantageous to them, not only in terms of cost but also for the convenience and benefits associated with it, which reinforces the findings of Heinonen and Strandvik (2018).

Validating Arcidiacono and Pais' (2018) and Vij's (2019) ideas, users are also attracted by the flexibility and convenience of shared mobility services. Thus, we highlight the importance of designing carsharing services integrated with other transport modes, considering the proximity with stations that allow this combined use and encouraging this use with unique cards, partnerships, and bonuses for those who use it frequently. In this way, it is possible to optimize the urban transport system, not to put more cars on the streets, but to value the different modes available.

4.3.4.2 Carsharing companies

In this unit, we sought to understand the nature of the companies responsible for the provision and operation of carsharing services studied, based on secondary data from literature and websites. As a result, the six cases studied can be classified according to the typology proposed by Lagadic, Verloes, and Louvet (2019): (1)

carsharing services providers, (2) traditional car rental companies that have entered the carsharing market, (3) vehicle manufacturers that have launched their own carsharing system, and (4) public actors (public transport operators or local authorities).

Cases B and E fall into the first group. Case B is a private company that has operated as a carsharing service provider since 1994. On the other hand, Case E was a startup, which worked as a carsharing provider from 2009 to 2019. For this profile of companies, acting in the shared mobility market can be challenging, as they need to invest in their fleet and the entire structure that makes it possible to offer the service. In this sense, company B, seen as a case of continuity that is still in operation, formed several partnerships with automakers and vehicle manufacturers, which allowed the expansion of the available fleet. It also articulated a series of acquisitions and partnerships that allowed its growth and operation to other countries and cities beyond the initial city. In Case E, we did not identify many partnerships during its period of operation, which may have contributed to the closure of the service in 2019, and its transition to a technology provider for other companies in the mobility segment.

Case F also started in 2000 as a private company and start-up. However, in 2007 it merged with another carsharing company, and in 2013 it was acquired and became a subsidiary of an already consolidated traditional group of car rental companies. This helps explain its position as one of the world's leaders in carsharing. Furthermore, since these services are capital intensive, especially in initial investments, this group of companies has the advantage of financial capacity and an established customer base to launch shared mobility services. In these cases, even without having a stabilized business model or profitability expectations, companies can test these services as part of a broader development strategy, as pointed out by Lagadic, Verloes, and Louvet (2019). Thus, we perceive company F as a case of continuity because it is part of a group with the necessary contribution to keeping the service in operation, both in the supply of vehicles and in the form of service distribution.

Cases A and C are part of the third type of vehicle manufacturers that launched their own carsharing system. Despite being well established in the manufacturing sector, they can be seen as new entrants to the Mobility-as-a-Service market. For these companies, carsharing services are strategies to reach the

younger customer base, less likely to buy a car, and give visibility to innovative products and expand the company's operation areas. Confirming the notes of Lagadic, Verloes, and Louvet (2019), automakers also have some advantages when entering the shared mobility market, such as that they are the vehicle suppliers themselves, being able to make them available and adapt them for the service, having a financial level necessary to bear risks, already having Information Technology systems, market research resources, brand recognition, and vehicle maintenance management. Like rental companies, many automakers enter the shared mobility market to test these new services, with no expectation of immediate profit. Although cases A and C have ended their activities, the interruption occurred to give rise to a new carsharing company, formed by the partnership of the two assemblers, which allowed the expansion of operations by combining their available technology and fleet.

Finally, case D is a subsidiary of a companies' group made up of public actors, such as public transport operators or local authorities. Despite being a private company, the government owns it, operates in the transport sector in Germany, and is responsible for managing the entire railway network. In this case, the company already has experience in providing mobility services and the possibility of integrating different transport modes with the carsharing service, which can be accessed using a single card. In case D, we verified the formation of partnerships with rental companies and even other carsharing companies operating in the country (case A). Despite being considered competitors, these partnerships served in the provision of vehicles since company D does not have its own fleet and thus avoids the high investment and cost of purchasing the cars.

Thus, when comparing the nature of the three continuity cases and the three interruption cases, it appears that it is not just the type of company that guarantees its success. Although some companies have advantages in carsharing services operation, such as automakers or rental companies, it appears that forming alliances, partnerships, and acquisitions is more decisive. This can be seen in company B, a private company, without the initial advantages of assemblers or rental companies, but which has been in operation for almost 30 years. On the other hand, it appears that in cases where not so many partnerships were established, the chance of closure is more significant, as in case E.

Therefore, we understand that continuity or interruption is not necessarily linked to the company nature but rather to its adaptive capacity and how it is articulated in the shared mobility solution-demand network. We understand that the company responsible for the carsharing service, be it a provider, automaker, rental company, or public company has the role of the central actor that articulates all other actors in the network. This network is dynamic and is in constant movement and transformation, as explained by Callon (1986). Thus, it is the role of the central actor to monitor these changes, managing the stakeholders in preserving the value and continuity of the service operation, whether they are users or suppliers, which also corroborates the ideas of Lackzo et al. (2019).

4.3.4.3 Support companies, suppliers, and manufacturers

In this registration unit, we sought to identify all other actors that contribute to the correct functioning of the service, considering the support actors and structures that aid the establishment of the platform in its value proposition, as mentioned by Couzineau-Zegwaard and Meier (2018) and Somers, Dewit, and Baelus (2018). To do this, we searched for mentions in Twitter and Yelp publications, in addition to searching for secondary data on websites.

The actors we identified in this unit can be divided into three groups:

- 1) Local outsourced partners to support operation and maintenance.
- 2) Suppliers in general: application technology, vehicles, energy.
- 3) Communication and advertising companies for disseminating the services.

In cases A and C, we identified mentions to outsourced local partners in the service operation and vehicle maintenance, as well as mobile devices application providers. For all cases, we also coded publications by advertising and communication companies, which used their own pages on social media to publicize launches related to carsharing companies.

In case B, roadside agents and a fleet team was mentioned, responsible for inspecting vehicle use and the proper distribution of cars in the company's area of operation. Case D had the mention of a local cooperation partner, which contributes

to the service operation. Cases D and F mentioned the role of a local maintenance and cleaning team. Finally, in cases B, D, E, and F, mention was made of partnerships with car manufacturers, assemblers, or rental companies to supply cars.

In this way, we verified the presence of different actors that contribute to the operation, supply, maintenance, and dissemination of services. The performance of these stakeholders is essential in the solution-demand network of shared mobility services, contributing to solutions for the demand that service companies are unable to meet. In addition, their actions interfere in the users' perception of the service, in issues related to the mobile application use, and in the distribution, maintenance, and cleaning of cars, so that they are in the proper conditions for use by customers, aspects also mentioned by Lesteven and Leurent (2016).

Therefore, companies, as central actors and the main ones responsible for providing carsharing services, must ensure that the performance of these local partners contributes to the positive experience of users. Furthermore, corroborating Somers, Dewit, and Baelus's (2018) contributions, companies must also provide an adequate sharing environment and infrastructure for suppliers to operate, considering scalability to meet user demands continuously.

4.3.4.4 Infrastructure and ecosystem (non-human actors)

In this unit, we identified the actants that constitute the infrastructure or ecosystem that allows service provision, as mentioned by authors such as Couzineau-Zegwaard and Meier (2018) and Vargo and Lusch (2017). These non-human actors provide structural support (Li et al., 2019), which works as the bridge connecting the service provider company with its users (Somers, Dewit, and Baelus, 2018). The non-human actors coded from Twitter and Yelp publications can be divided into four groups:

- 1) Carsharing vehicle: the service's primary artifact, since the user pays for the use of access to the car as a form of mobility. These vehicles can be standardized, as in some services that only have one model, or varied in size, and gasoline combustion, or powered by electricity.

- 2) The platform that allows service use: refers to the mobile device application, website, or card through which the user activates the vehicle's access to use the service.
- 3) Urban infrastructure: consists of all the equipment and structure necessary to provide user access, such as the charging stations for electric vehicles and the specific spots to pick up cars.
- 4) Vehicle availability sites: In addition to infrastructure, companies can also partner with other operating locations, to expand the availability of vehicles in strategic and convenient places for users, such as airports, markets chains, and universities.

Groups (1) and (2) are present in all cases since the vehicle is the central artifact of a carsharing service, and all companies need some platform, whether digital (application) or physical (card), to allow their customers access to cars.

Except for case E, all other cases have charging stations for electric vehicles regarding the urban infrastructure. In many cases, these stations are not exclusive to the service provider company, being part of the urban structure and shared with electric vehicle owners. In case C, the users' reports mentioned the lack of charging stations, highlighting that the cities should receive an adequate infrastructure to offer carsharing services.

As for the places where vehicles are made available, we found that all cases had partnerships with strategic points, but some cases with more variety than others. For example, cases A, B, and F partnered with airports, hotels, universities, markets, cafes, bookstores, and furniture stores, identified as places of great circulation of carsharing customers and thus seen as strategic points to facilitate and encourage its use. Case D partnered with railway station points, promoting the combined use of transport modes, while case E had a partnership with 24-hour private parking where users picked up vehicles. In case E, the users gave suggestions for other places, such as restaurants, banks, and shopping centers.

Thus, contributing to the notes of Callon (1986) and Li et al. (2019), we understand that, as human actors, non-human actors are equally essential in shared mobility services, as they enable the connection and provision of services by companies to their customers. Considering the perspective of Service Design and based on the concepts proposed by Moritz (2005), non-human actors can still be

considered the touchpoints that the user has with the service, essential to ensure the company's good interaction with their users.

Among these non-human actors, we noticed that urban infrastructure and vehicle availability sites have a relationship with the next group of actors, the government, and local authorities.

4.3.4.5 Government and local authorities

In this registration unit, we identified the actors related to public authorities. This group comprises the actors responsible for granting public-private partnerships, such as governments and city halls, and the agents accountable for regulating carsharing services in the urban territory, mentioned by authors such as Lagadic, Verloes, and Louvet (2019). We identified these actors by reading the publications on Twitter and Yelp and secondary data about the companies collected in the literature and their websites.

In case D, there is more extensive involvement of the public actor. Despite the company being private, the German government is its sole shareholder, together with the company that operates the country's railway network. Except for case E, the other cases formed public-private partnerships with the city halls of the cities in which they operated. This partnership mainly granted parking spots on public roads, some of which were dedicated exclusively to carsharing services, particularly for electric vehicles, also providing charging points. We did not verify partnerships with the city hall in case E, as the cars had to be picked up and returned to private parking lots.

As for company C, users mentioned in their tweets the presence of police and traffic agents, who carried out inspections, application of fines, and tow trucks in irregular parking situations, since company C's cars could be parked on public roads. However, even with this inspection, the problems of illegally parked vehicles were often mentioned in the comments we analyzed.

Regarding the four city halls that responded to the questionnaire, we found that three are more involved in carsharing service operation in their cities, contributing with benefits and incentives. In their responses, we found that in addition to these incentives having advantages for carsharing companies, city halls also feel

benefited by the partnership with these services, listing several positive points for urban mobility.

Thus, it appears that the presence of public authorities can contribute to facilitating the carsharing service operation in cities, mainly through incentives such as parking spaces on public roads or other benefits, an aspect also verified by Terrien et al. (2016). However, these public-private partnerships must favor both parties and not harm other city dwellers, with the loss of public space for the use of private services.

On the other hand, contributing to the publications by Coxon, Napper, and Richardson (2019) and Lagadic, Verloes, and Louvet (2019), the joint action between government and carsharing companies consists of opportunities to improve the urban transport infrastructure, with the availability of more stations for charging electric vehicles, encouraging the use of clean energy vehicles, and actions that promote integrated use with other modes, optimizing the urban transport system, with benefits for the entire population.

4.3.4.6 Citizens (society)

In this last registration unit, the purpose was to identify how society is involved in the network of carsharing services (Ferrero et al., 2018) and the perception of citizens who are not users of these services.

We did not identify citizen comments on cases B, D, and E. Cases A, C, and F had similar reports of angry citizens. The main reasons for the complaints are the increased use of public spaces for carsharing services, thus reducing the number of spots available for other vehicles. Another reason is the inconvenience, such as carsharing cars obstructing garages and sidewalks or parked at pedestrian crossings. In addition, citizens who own electric cars complain that they can no longer use public charging stations, as they are mostly occupied with carsharing electric vehicles. Therefore, the station should only be used to recharge electric cars, not as parking spaces in these cases.

Based on these reports, we point that carsharing services should operate in harmony with other modes of transport and not harm citizens who do not use such

services. These recurring problems only make citizens lose interest in joining this type of service when they could promote actions to encourage shared mobility services.

Consequently, reinforcing the ideas of Ojasalo and Kauppinen (2016) and Sopjani et al. (2019), companies should also consider citizens as participating actors in the network since the service impacts all inhabitants of the urban space, and many can be potential customers. Furthermore, by accepting and adhering to the new proposals for shared mobility, citizens contribute to the network collaboratively, helping service providers increase the number of supporters of the platform and assisting local authorities to create more sustainable and innovative mobility initiatives for better use of urban space and territory.

4.3.4.7 Synthesis of the Actants of Shared Mobility Services Network Category

By analyzing all these actants in the six case studies, we verified the importance of identifying which actors are present or absent in the service's operating network. Mobility solutions through carsharing can only be offered through the integrated action of different actors, as companies alone do not have all the capabilities. In this sense, the most important thing for the success of a carsharing service is not only to have all the actors in the network but to verify the contribution of each one through the formation of partnerships and value co-creation strategies. Each of the actors has different interests related to the value they can obtain from the operation. Thus, corroborating Ojasalo and Kauppinen (2016) and Terrien et al. (2016), it is vital to understand the actors' motivations to align interests among all actors in the network.

Thus, we understand that all actors we identified from the registration units are somehow present and related to all analyzed categories. Therefore, what stands out are the interaction actions between the actors in the mobility services solution-demand network.

4.3.5 Analysis Category of the Interaction between Actants in Shared Mobility Services Network

The last analysis category comprises interactions between actants in the shared mobility services network, which can occur through trust and value co-creation or co-destruction.

4.3.5.1 Trust and reliability

In this unit, looking from the consumer's perspective, our objective was to verify the consumers' trust level in the services studied. The questionnaire answers helped to identify the percentage of users' trust and reliability perception. When collecting data on Twitter and Yelp, the focus was on posts that described trust or not in the company (LIANG; CHOI; JOPPE, 2018). Almost all comments mentioned the lack of trust, with recommendations such as don't depend on the company, don't trust, the service is unreliable:

Service from F is NO substitute for owning a car. DO NOT RELY ON THEM! If you're over 25, you're better off going with a normal rental company. (Yelp review from August 08, 2010).

Most of the reports mentioned the lack of trust related to reservations, availability, and access to vehicles. In these cases, the complaints were about unexpectedly canceled reservations, changes to the booking location just a few minutes before the rental start, and the absence of the vehicle at the indicated site, making it difficult for users to trust the service when there are no cars available:

Will your car actually be at the specified location when you go to pick it up? Maybe...maybe not...Who knows! COMPANY F DOESN'T CARE, you need to walk around the whole city and locate it yourself and then carry on as if nothing happened. This sends a clear message that company F is unreliable and they absolutely don't care about you as a customer. (Yelp review from September 17, 2015).

Other publications also cite distrust regarding fees, stating that the services are unreliable because they do not show transparency in the way they are charged or because they change prices without prior notice, with users feeling cheated:

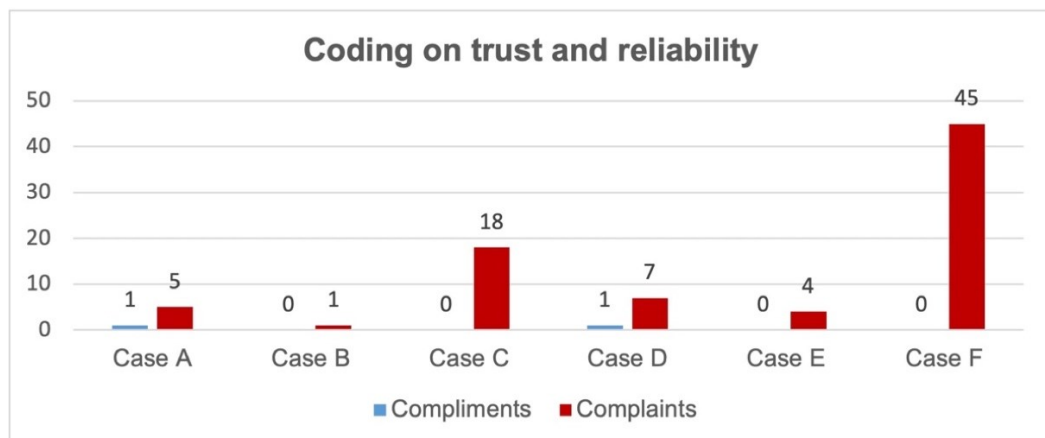
Found out a cheaper way with the "ONEWAY" trip they offered. Come to find out THAT OFFER DOESN'T EXIST. Every time I'd try and reserve a car starting in Providence I would get the "Whoops. We're not there yet" msg which was frustrating. I've talked to a supervisor, manager and even tried contacting corporate. Cause it's ridiculous that they offer something they don't even have. FALSE ADVERTISEMENT. They pretty much just try to rob you. Don't bother becoming a member it's a headache and a complete waste of time and money. (Yelp review from May 26, 2017).

Completely misleading. After my first trip I noticed it cost only 1\$. Called customer service right away to see if this was normal. The gentleman I was speaking to said "yes, as a new member, you are on the flex plan so you have unlimited trips under 30 minutes until May 20" my credit card bill did not reflect that. I spoke to three different customer service representatives including a manager. Trying to get a refund is nearly impossible, this company doesn't care about their users. I feel completely misled and ripped off. Cancelling my membership and never using carsharing service from B again. (Yelp review from May 12, 2020).

Analyzing the users' reports and corroborating the ideas proposed by Liang, Choi, and Joppe (2018) and Möhlmann (2015), we noticed that there is a relationship of trust with satisfaction, and consequently with the intention or not of reuse. Many of the comments mention that the service cannot be trusted, especially when there is an important appointment scheduled, with examples of situations in which the person was late or missed a meeting due to not finding the vehicle, even with the advance reservation. Some users even recommend that carsharing be used for situations where you are not so dependent on schedules or that you have other mobility alternatives.

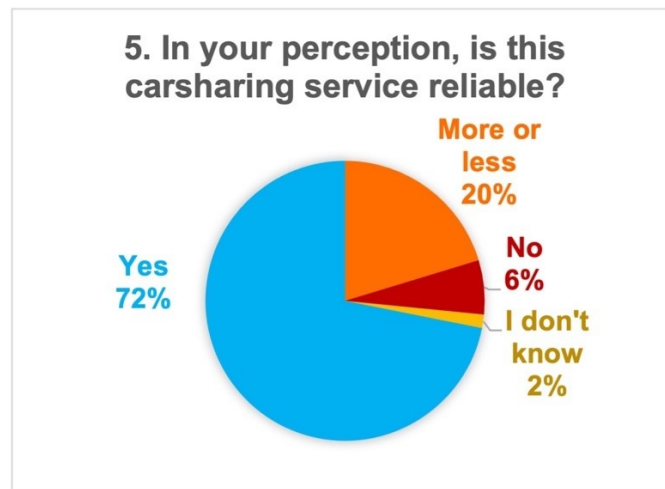
Chart 39 illustrates the 82 reports coded in this unit, separated by complaints (total of 80) and praise (only 2). Chart 40 shows the responses to the user questionnaire about the perception of the service's reliability.

Chart 39 – Distribution of coding on trust and reliability



Source: Own Authorship (2021).

Chart 40 – Total responses to the user questionnaire on reliability



Source: Own Authorship (2021).

When observing the comments, we noticed more complaints than compliments because, in online publications, the perception of trust is usually associated with one bad experience or a situation of distrust that the user has gone through. On the other hand, in the responses to the questionnaire, the user assesses trust as a whole, considering all situations of use. In addition, those who demonstrate an interest in answering questionnaires online often like the service and use it frequently, which is also reflected in the positive response of reliability. In this unit, however, since all of them had similar complaints about the lack of trust in the reservation system, there was a general problem in all companies regarding access and cars' availability or charging methods.

Reiterating Liang, Choi, and Joppe's (2018) ideas, the user's lack of trust in the service impacts their user experience, satisfaction, and consequently on their intention to return. For example, suppose the user loses confidence in the service. In that case, they may become dissatisfied and no longer want to use it, migrating to competing services, also pointed out by authors such as Kumar, Lahiri, and Dogan (2018) and Lagadic, Verloes, and Louve (2019). Furthermore, trust impacts the user's recommendation about the service to others. As seen in the reports, people do not recommend the service precisely because they do not consider it trustworthy. We understand, therefore, that trust works as a mediator between satisfaction and repurchase intention, which also impacts customer retention and service continuity.

Finally, in line with the concepts of Botsman and Rogers (2010), trust is also related to the context of collaborative consumption and the interaction between

actors in the solution-demand network. This aspect was mentioned in the two positive reviews coded in this unit:

@A #customerservice #milan is the example on how to build the so called alliance with their customers. How? Trusting each others. Bravo. (Tweet from April 03, 2015).

Thank you for making an offer at such points as well. But that needs a fallback. Especially where people don't yet believe in car sharing. I'm one of the few people who believe in conviction here. (Tweet from December 23, 2019).

Thus, contributing to the propositions of Liang, Choi, and Joppe (2018), trust in sharing economy services involves both the trust that the customer has in the service provider company (institution-based trust), considering the correct operation and adequate charging, as to the disposition to trust other users (willingness to trust people), trusting that they will use them correctly, without damaging the vehicles, and respecting reservation times, so as not to harm the following user in actions of value co-destruction.

Trust goes beyond user reliability only in the functional aspects and service quality, as it also involves establishing trust in the actors' network. Thus, as Chowdhury (2017) and Hu (2019) also point out, we reinforce the importance of trust in building a strong relationship between customers and sharing providers to act together in the network value co-creation. A successful value co-creation depends on establishing trust between actors.

4.3.5.2 Value co-creation

The objective of this unit was to verify the existence of actions that promote co-creation between the various actants participating in the service network. We tried to identify interaction actions between two or more actors in the network (Grönroos and Voima, 2012), such as the relationship between users, the participation and involvement of users in the company's actions, the company's interaction with other stakeholders, and the development of public-private partnerships with city halls.

In this registration unit, we analyzed the data collected on Twitter and Yelp, both in the perception of users and in the identification of company actions and the

perception of users and city halls based on their responses to the questionnaires. In the reports, we coded several user initiatives to contribute to the functioning and improvement of the service, as in the following examples:

I will, but to be clear, I'm suggesting a general app feature: filter by car type eg sedan, SUV, cargo van, instead of just by specific model. Though having more cars available would be great, too. (Tweet from February 18, 2018).

How do we request new @F locations? I'm in a busy area where grad students would benefit from the service! (Tweet from July 20, 2015).

Your app doesn't show time zones - nightmare when booking @F in different countries... (Tweet from June 13, 2017).

@A app feature request: push notifications when a car appears in a predefined area - I'm more likely to use a car when it gets close! (Tweet from February 22, 2015).

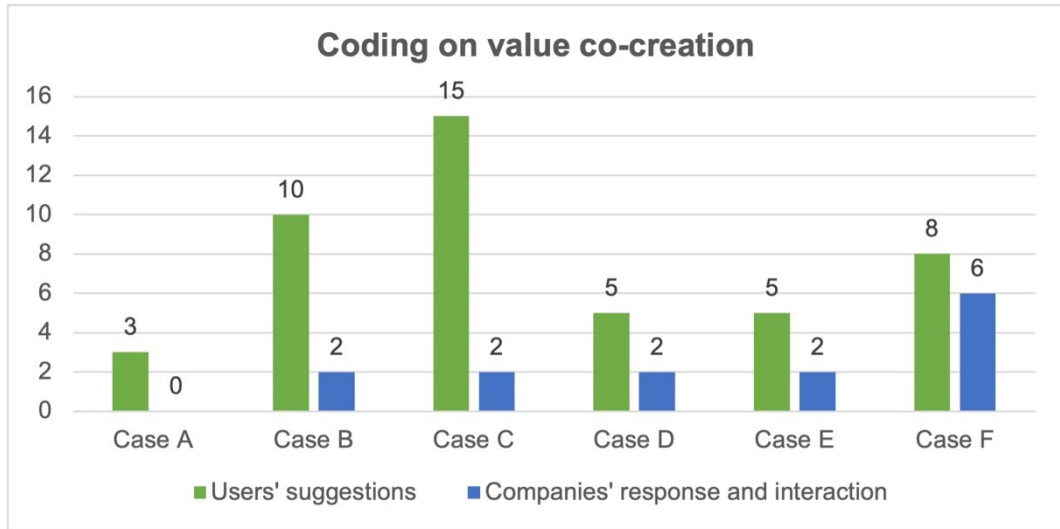
We also searched for indications of publications, responses, and interactions of companies with the comments of their users:

Hi there! We are always looking for ways to improve. What made your experience with us so disappointing? Thank you. (Tweet from October 21, 2014).

You asked, we answered. Monthly waivers are now available. (A few restrictions apply, so get the deets on our site.) (Tweet from February 17, 2011).

Chart 41 illustrates the total distribution of coded comments on co-creation. In general, we observed more initiatives by users to contribute to improving the service. Of the 60 coded comments, 46 were users' suggestions, and only 14 indicated response and interaction from the companies.

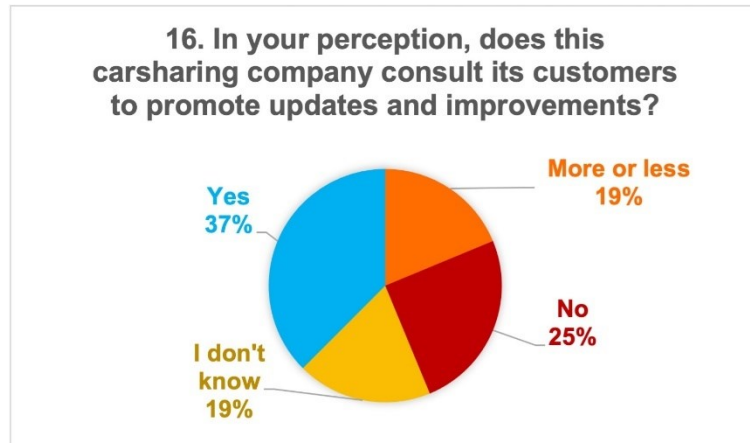
Chart 41 – Distribution of coding on value co-creation



Source: Own Authorship (2021).

In the responses to the user questionnaire (Chart 42), about half of the respondents (56%) believe that companies somehow consult their customers to promote updates and improvements. In comparison, 44% do not know or do not consider such initiatives from companies.

Chart 42 – Total responses to the user questionnaire on co-creation



Source: Own Authorship (2021).

Analyzing the comments and responses of individual cases, companies appear to consult their customers to promote improvements for about half of the respondents. For example, in the reports on companies A, C, D, and E, we observed that users contributed with several suggestions for improvement, such as new functions in the mobile application, alternative establishments for partnerships and

expansion areas, and the service operation in general. We also found that company B uses social networks to allow this interaction with users, asking its customers to indicate places where they would like the service to operate. Company D has also shown an interest in considering customer suggestions, such as implementing an in-app functionality that notifies the user when their contracted usage time is nearing its end.

Finally, we also analyzed the city halls' perspective. When asked about the actions to promote the public-private partnership between the city hall and carsharing companies, we noticed very similar answers. Of the four city halls, only one informed that there are no partnership actions. The other three commented on the attractions for the services' users, such as exemption of rotating parking costs and discounts on electric car rates for users of the public transport system. Thus, from the view of city halls, there is a promising future for carsharing in their cities, as long as the operation and feasibility plan are adequate to the reality of the local population.

So, in the same sense as the ideas of Grönroos and Voima (2012), Lusch et al. (2007), Prahalad and Ramaswamy (2004), Zhang, Jahromi, and Kizildag (2018), we understand that co-creation happens when two or more actors interact or influence each other, in actions that involve both providers and suppliers, as well as consumers with other actors, to generate network value. Therefore, to contribute to the operation of the service's solution-demand network, all actors must feel benefited and integrated, which reaffirms the statements of Reim, Parida and Örtqvist (2015).

Thus, we verify the importance of companies involving and considering the customer perspective in their solutions and services, as active actors in creating value, as proposed by Turetken et al. (2019). In addition to pointing out flaws and proposals for improvements, consumers' engagement contributes to the perception of value that the customer has in the network, which is also pointed out by Grieger and Ludwig (2018). Likewise, co-creation with city halls and local authorities should promote actions that contribute to the perception of value for cities, urban mobility, and citizens' quality of life.

At last, corroborating Callon (1986), Lackzo et al. (2019), and Turetken et al. (2019), we also highlight the role of carsharing service providers as central actors, responsible for continuously interesting and enrolling new actors and maintaining existing stakeholders, through the effective orchestration of value co-creation. Considering that a solution-demand network is composed of several actors, each one

has a specific function and interests that keep them adherent to the network. Therefore, agreeing with the statements of Li (2019) and Stickdorn and Schneider (2010), companies should understand and work on the balance and alignment of these actors' interests.

Still, another essential factor is the network's adaptive capacity to maintain this adherence and reduce the probability of changes to competitors, which is also considered by Laczko et al. (2019). It's harder to retain participants if the network doesn't provide lasting value. Therefore, corroborating Niemimaa et al. (2019), it is vital to invest in actions that allow constant transformation and improvement of the network. Thus, all actors perceive the value co-created in activities that benefit everyone, avoiding value co-destruction.

4.3.5.3 Value co-destruction

In this unit, our objective was to verify actions that promote or prevent the value co-destruction between the actors of the carsharing services network. For example, in Twitter and Yelp publications, we coded reports of negative encounters of users with the services and misuse of its resources. These may be accidental or intentional, resulting in the decline of one or more points of the networks' well-being, like Yin, Qian, and Shen (2019) pointed out. In both the comments and responses to the questionnaire, we sought to understand the users' perception about co-destruction situations among users resulting from service misuse by the customers themselves. The answers to the questionnaires also brought the perception of co-destruction interactions between consumers and the company and between city halls and companies.

The reports coded in this unit can be separated into four main categories. In the first, we found many complaints of carsharing vehicles parked in prohibited places and intersections:

Your cars are consistently parked in the handicap spot on Hubbell at 16th St, SF. (Tweet from April 22, 2016).

What!? You're leaving your abandoned car blocking the intersection to 12 St in Park Slope and blocking any plows until tomorrow!?!? (Tweet from December 21, 2010).

We also coded cleaning complaints. Although there is already a unit related to cleaning in the quality analysis category, here the emphasis is on the co-destruction resulting from these reports by the complaint of other users:

To anyone who uses @A carsharing service... Specifically in Toronto. If you leave trash behind; ie empty coffee cups, Kleenex, orange peels, fast food rubbish, etc; you are a disgusting person and I hate you!!!! This ain't your personal vehicle. Behave! (Tweet from December 21, 2017).

I have complained to @C for smoking smell but this is another level. Definitely report it. (Tweet from April 02, 2019).

The third aspect we identified in the reports is related to the fines and fees charged by companies, as a way to prevent and penalize co-destruction, but which are sometimes improperly charged:

Damage fee should not apply to my account when the incident didn't even happen during my reservation. (Tweet from November 17, 2015).

@F cleaning policy is absurd. I just got charged \$50 for a stain on the floor that a) wasn't me and b) I couldn't see at night. (Tweet from February 03, 2013).

#DonotuseA you will be responsible for the car after rental ends and till somebody else rents it!! #thatsCrazy #badcustomerservice #neveragain (Tweet from May 30, 2019).

Carsharing companies are tricking people! You are responsible for the car till somebody else rents it!! Did you know that ? It's #unfair to the consumer. I got a \$70 parking citation for a \$14 ride!! #neveragain (Tweet from May 30, 2019).

At last, we also observed reports of problems related to shared use: people leaving their car without fuel, cigarette smell, they use it as if it were their own car, without worrying about the following user, and do not return the vehicle on time to those who reserved it for later use.

With that said, please don't become a member of @F carsharing unless you can respect the fact that this CARSHARING. Put the gas card back where it belongs, put gas in the tank when it needs it, and if the funky light comes up on the dashboard get on the cell phone and call F. If this is too much for you, please keep your car. Thank you. (Yelp review from May 25, 2006).

One thing -- if you *are* going to use @F, please return the car on time! I'm serious -- once in a while I see that guy who returned the Mazda3 late, and I still give him an evil look (damn, that was almost a year ago -- I need to lighten up) (Yelp review from July 26, 2006).

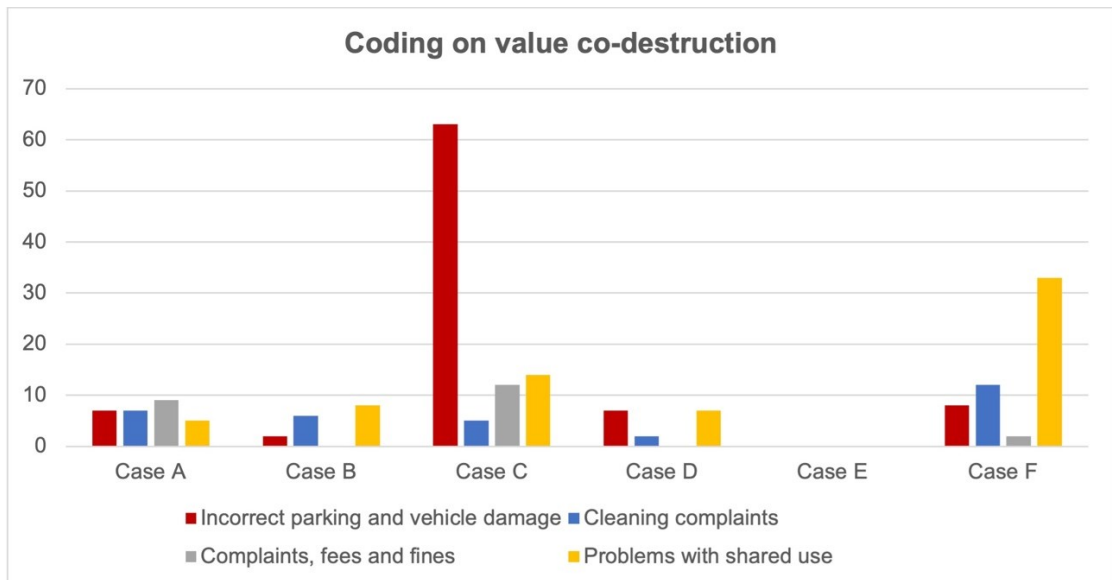
I'm sick of late cars. I'm sick of dirty cars. I'm sick of missing cars. Most of all, I'm sick of people smoking in the cars. That's the thing that is keeping me from renewing my membership after it expires in July. I'm sick of the lack of respect inside the community of members. But @F is also responsible for enforcing the rules and doling out fines and punishments. And if the bad apples aren't removed from the community, I just get more and more pissed off. (Yelp review from May 16, 2009).

Classic @F, previous renter left the car a mess and less than a quarter tank of gas, so that I had to fill up and was 4 minutes late for the return and forced to extend my reservation. As usual, no response to the complaint I submitted... (Tweet from December 14, 2017).

Chart 43 illustrates the total distribution of coded comments on co-destruction in the six cases. In all, there were 209 comments, divided into:

- a) Incorrect parking and damage: 87.
- b) Complaints about cleaning: 32.
- c) Complaints, fines, and fees: 23.
- d) Problems with shared use of vehicles: 67.

Chart 43 – Distribution of coding on value co-destruction

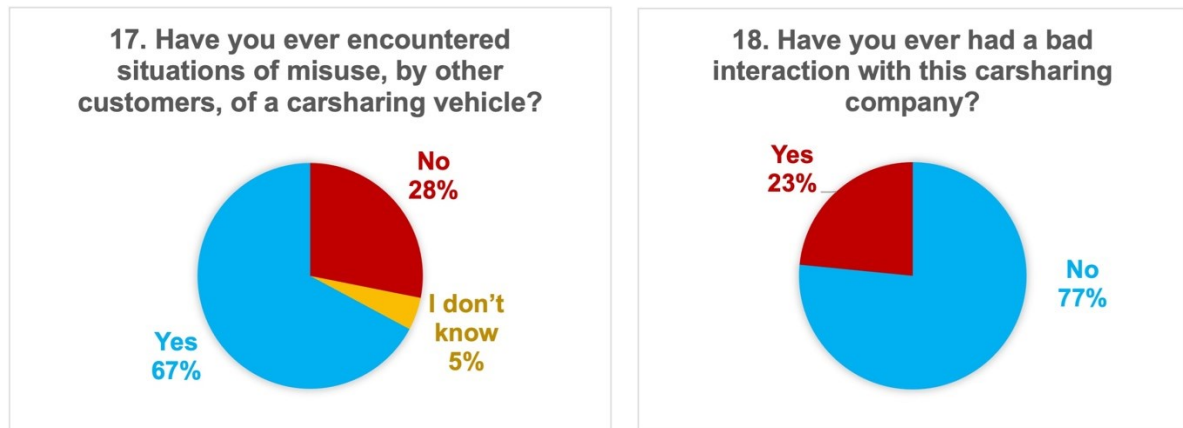


Source: Own Authorship (2021).

In the responses to the user questionnaire (Chart 44), 67% of respondents said they had experienced situations of service misuse by other users. However, only

23% had bad interactions with the company. This shows that the co-destruction issues in the cases have more to do with customer behavior in shared use than with the companies that provide these services.

Chart 44 – Total responses to the user questionnaire on co-destruction



Source: Own Authorship (2021).

Despite the variation in the number of complaints between cases, all had similar issues. Of the four sets of complaints, three are related to value co-destruction between users: incorrectly parked cars, dirty vehicles, and problems with shared use in general. Issues related to the application of fees and fines are more related to co-destruction between companies and customers. However, part of the cleaning problems is also associated with the lack of periodic maintenance by companies.

Regarding company actions to avoid these co-destruction interactions, some companies had an app feature that allowed users to assess the car's condition, in terms of cleaning and damage, before starting the rental. On the other hand, due to the recurrence of reports, users who committed infractions or co-destruction actions do not seem to have been punished, or the company did not seem to be aware of these problems, as the reports continued to appear, with allegations of the same issues. Thus, this co-destruction only makes users angrier since it is recurrent, and companies do not implement actions to mitigate these complaints.

Therefore, we verified a general problem in the studied cases of carsharing services in monitoring and penalizing co-destruction situations. Many of the comments reinforce that companies only became aware of issues due to notifications from users. The companies themselves also claim that they cannot monitor all the

cars due to the quantity and distribution, although some have a local inspection and maintenance team. We also verified other co-destruction reports between consumers and the company. In some cases, users reported misuse from other customers through the mobile app, but those who reported misuse were taxed for the damage.

In this sense, one of the main points for companies is to improve the way they follow up on co-destruction problems. Service providers can encourage positive and supportive practices to enable the transition from value co-destruction to value co-creation. An example is the credit reward mechanism, valuing customers who practice maintenance and voluntary cleaning actions or send notifications when they find damaged products; solutions also proposed by authors such as Yin, Qian, and Shen (2019). Users' reports can help the company monitor all the cars, but this function needs to work correctly and not penalize those who were not responsible for the damage.

Considering the perspective of city halls on co-destruction, they responded that the main actions to prevent carsharing misuse should come from the providing companies. Thus, providers must monitor their vehicles in real-time, with battery, position, and speed control. On the other hand, city halls also mentioned laws regulating the individual transport of passengers so that traffic agents have the authority to impose fines on carsharing users. In this case, we understand that carsharing users' co-destruction also affects other citizens, especially in the misuse of urban territory. Therefore, it would be more appropriate for the company to cooperate, through a local distribution team, with traffic agents, to inspect carsharing vehicles operating in cities.

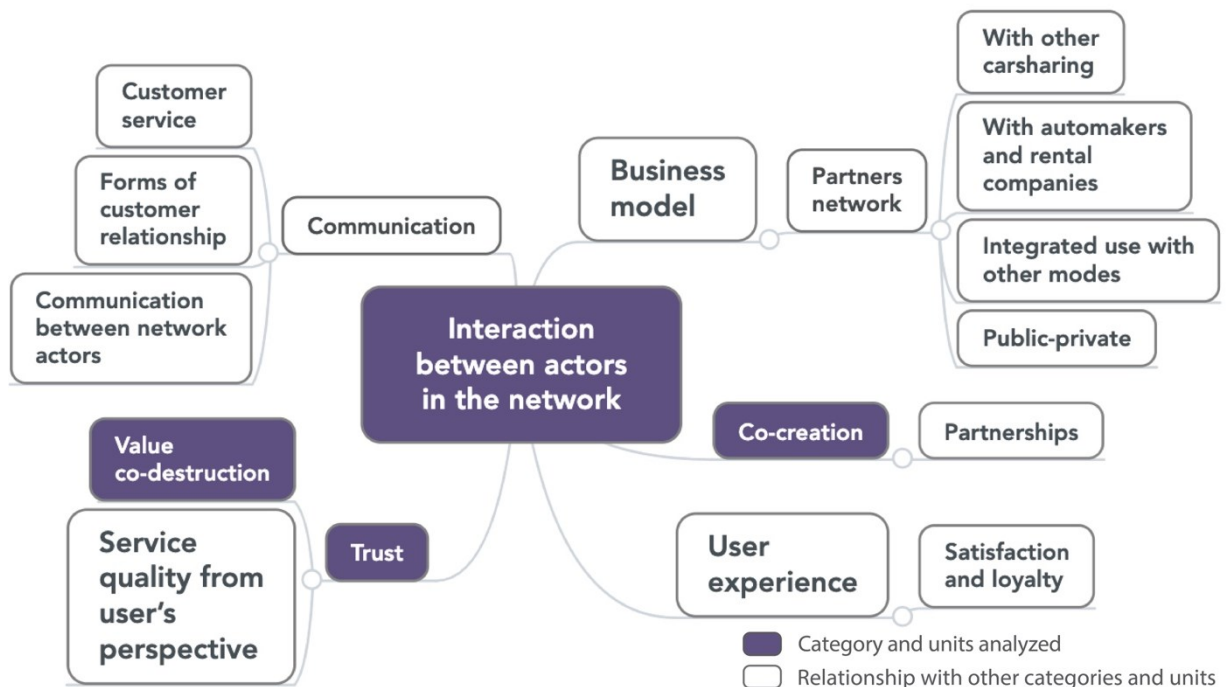
Finally, contributing to the findings of Sthapit and Björk (2019) and Yin, Qian, and Shen (2019), we also noted that some of the co-destruction problems are more related to shared use itself, as the sharing economy business models are subject to a higher risk of misuse by users. These problems are more challenging to mitigate in the short term, as they involve changing users' behavior regarding shared services.

Therefore, it is crucial to understand that value co-destruction is one of the main barriers and challenges of the sharing economy, highlighting the ideas of Sthapit and Björk (2019). In addition to interfering in the user experience, in their perception of quality and satisfaction when using the service, co-destruction actions harm all actors in the network, directly or indirectly.

4.3.5.4 Synthesis of the Interaction between Actants in Shared Mobility Services Network Category

After analyzing the three registration units in this analysis category, we conclude that all are highly relevant for the operation of shared mobility services. Figure 35 summarizes the relationship of the registration units analyzed in this category and shows their relationships with the other analysis categories and registration units.

Figure 35 – Summary of the category of Interaction between actors in the network and its relationship with other categories



Source: Own Authorship (2021).

Therefore, we realize that interaction between actors in a mobility service solution-demand network mainly occurs through trust, co-creation, and communication. The actors' integration through trust also involves the reliability of service access and use aspects, such as billing, maintenance, and cleaning. In this sense, it is also related to the user experience, impacting their satisfaction and decision of loyalty or not to the service. Furthermore, trust is also associated with value co-destruction. When users face misuse problems by other users, they lose trust in the service, in the company, and other users and may give up on the service. Thus, trust and co-destruction are associated, constituting critical factors in the

interaction between service actors in the sharing economy. Finally, trust also depends on the integration and co-creation of value between all actors in shared use to avoid value co-destruction actions.

There is also an interaction relationship between the actors concerning the business model, as it considers the networks of partners that the companies establish. The integration of network actors in partnerships through value co-creation actions is a critical success factor, as these actions are carried out to benefit the entire network and contribute to the success of its operation. Furthermore, the forms of relationship with the customer, defined in the business model, consist of the company's communication with its customers and with all the actors that support the solution-demand network. Therefore, communication allows the interaction of actors with each other in actions that must involve both trust and value co-creation.

4.4 ANALYSIS SYNTHESIS

The entire analysis process was conducted by comparing the six case studies according to the 28 registration units belonging to the 5 analysis categories. Appendix G shows a table with an example of this comparison for one of the analyzed registration units.

During this analysis, we identified how each unit could be verified in the studied services. We found that some units showed greater relevance and relationship with the other analysis categories during this process. Therefore, after analyzing the correlation between the cases studied, these units were relocated into different categories. Among these relocated units, we highlight:

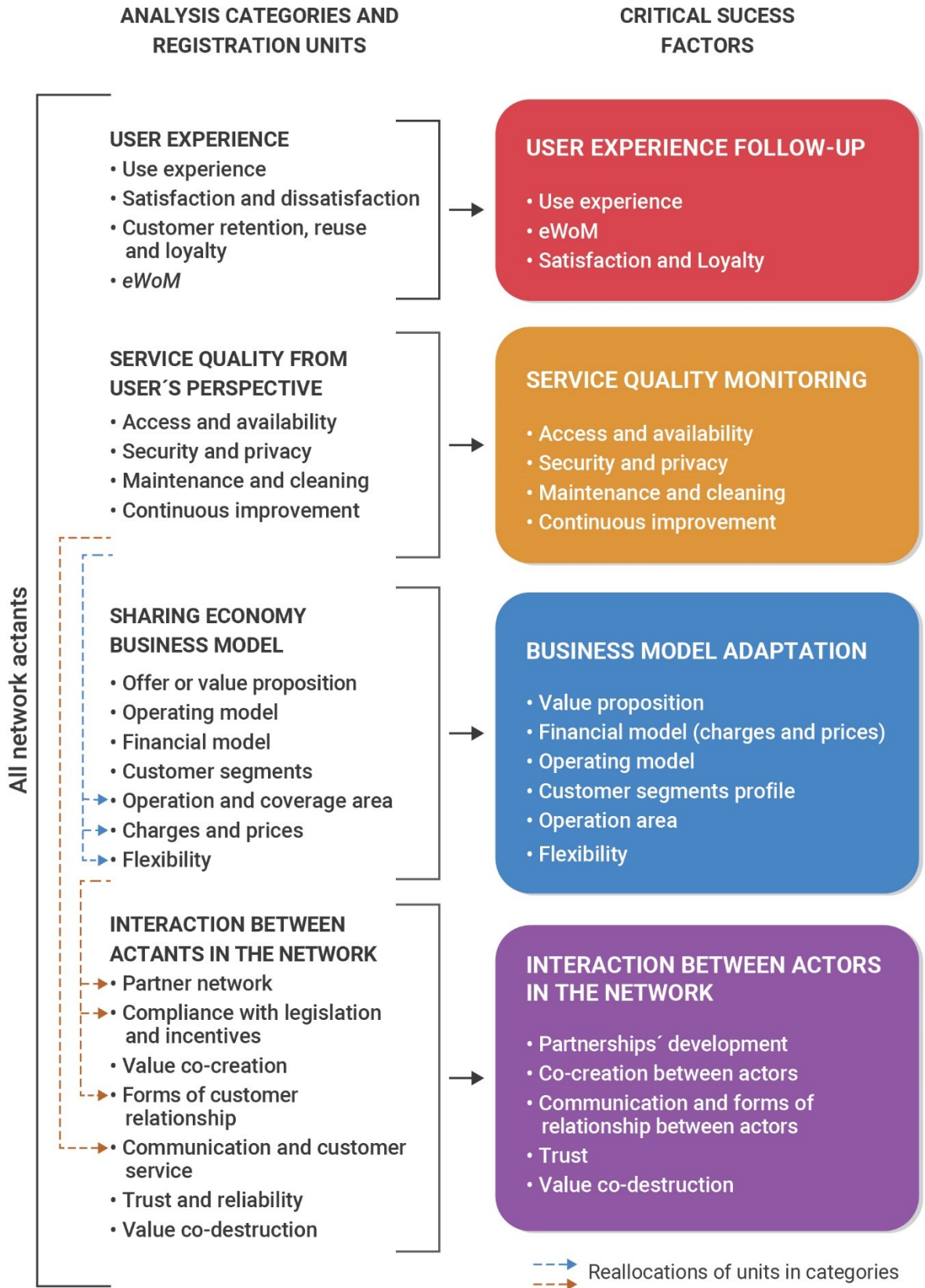
- 1) The registration units of Operation and coverage area, Charges and prices, and Flexibility were relocated from the Quality category to the Business Model category. We opted for this change because, after analyzing and identifying how these units were present in the cases, we realized that the aspects referring to these three units are more relevant to the business model strategy. The operation area, for example, depends on the space established by the company when implementing the service, also considering issues of agreements with the city hall. Therefore, although there are users'

problems related to the quality of the operation and coverage area, most of them are related to the company's own business model. The same can be considered for charges and prices, as they are associated with the financial model established in the company's business model. Finally, flexibility is also related to the customer segment, and the company can seek more flexible solutions that meet the needs of its target audience.

- 2) The communication unit was relocated from the Quality category to the Interaction between network actants category. Although communication and customer service are aspects of quality in the customers' perception, we noticed that the essence of the communication unit is more related to the very elements of the Interaction between the actors. In addition, communication does consider not only the forms of relationship between the service provider company and its customers but also the communication and relationship between all the actors that make up the solution-demand network for the operation of a shared mobility service.
- 3) The units of Partner network, Compliance with legislation and incentives, and Forms of customer relationship, despite being part of the service's business model strategy, were also relocated to the category of Interaction between network actants. This repositioning was done by verifying that the aspects related to these registration units were more relevant to value co-creation processes in the interaction between actors.

Thus, the analysis started from an initial set of 5 categories with 28 registration units, proposed in the conceptual-theoretical model. During the process of interpretation and correlation between the case studies with the registration units and their respective analysis categories, some units were reallocated according to their relevance. This process allowed, therefore, to determine a final set of 18 critical success factors in the operation of shared mobility services, classified into four groups of different natures. Figure 36 shows the scheme of this process of defining the critical success factors from the initial units and analysis categories, showing the junctions and reallocations indicated by the dashed lines. We highlight that the category of Actants identified in the solution-demand network permeates all other factors since they make up the service network and must be present in its various aspects.

Figure 36 – Scheme of the critical success factors definition



Source: Own Authorship (2021).

We detail these critical success factors below.

4.5 CRITICAL SUCCESS FACTORS

We determined 18 critical success factors in the operation of a carsharing solution-demand service network, classified into 4 groups of distinct natures:

- 1) User experience follow-up.
- 2) Service quality monitoring.
- 3) Business model adaptation.
- 4) Interaction between actors in the network.

Figure 37 presents the final model representing the 18 critical success factors, grouped into 4 classes related to each other. Problems that occur in one of the factors can impact the others, interfering with the full-service solution-demand network. Thus, each critical factor has its relevance in the service operation, and it is the set of these factors that constitutes the success of the carsharing service solution-demand network. Next, we describe and detail each group of factors.

Figure 37 – Critical success factors in carsharing services operation

Interaction between actors in the network

- Partnerships' development
- Co-creation between actors
- Communication and forms of relationship between actors
- Trust
- Value co-destruction

Business model adaptation

- Value proposition
- Financial model
- Operating model
- Customer segments profile
- Operation area
- Flexibility

User experience follow-up

- Use experience
- eWoM
- Satisfaction and loyalty

Service quality monitoring

- Access and availability
- Security and privacy
- Maintenance and cleaning
- Continuous improvement



Source: Own Authorship (2021).

In the User experience follow-up set, we grouped the critical factors of Use experience, eWoM, Satisfaction, and Loyalty. These critical factors are essential to ensure a positive experience of using the service by customers, interfering with their satisfaction and loyalty, and in the recommendation and dissemination of the service to others through eWoM. In addition, the factors related to the User experience are connected with the other critical factors, since all the factors of Service quality, Business model, and Interactions between actors influence the journey and the user experience when using the service, which can contribute to the continuity of the service network.

The Service quality monitoring class groups the critical factors of Access & availability, Security & privacy, Maintenance & cleaning, and Continuous improvement. These factors also interfere with the others since functional use aspects contribute to the user's experience and complete journey, impacting their satisfaction, loyalty, and service recommendation. These factors related to Service quality monitoring can also indicate what may be adjusted and improved in the service's business model, such as the operating model, operation area, and charging methods. Furthermore, all responsible actors must be integrated and work together in the service operation for the proper functioning and quality of the service. Considering that the service is formed by a solution-demand network, the purpose of this network is to keep the service in operation. Therefore, it is essential to consider this group of critical factors concerned with service quality issues.

The critical factors grouped in the Business model adaptation class are Value proposition, Financial model, Operating model, Customer segments profile, Operation area, and flexibility. These factors consider the design of a business model solution that is in line with the demand and the monitoring of this demand for possible changes and adaptations that may be necessary for the solution. It involves, for example, readjusting the operating model options, offering diversified options of the carsharing vehicle pick up, considering flexibility, and customer segment profile. Therefore, these critical factors related to the Business model adaptation reflect both the company's strategic actions in providing the service and its necessary adaptation actions to its business model. Thus, the actions outlined in the business model critical factors reflect the service used by consumers, interfering in the Service quality and the User experience, and interfering in the provider company's relationship with the other actors of the service network.

The last class of critical success factors integrates the Interaction between actors in the network, considering Partnership's development, Co-creation between actors, Communication, and forms of relationship between actors, Trust, and Value co-destruction. These factors consider the creation of bonds between the various actors that make up the solution-demand network of a carsharing service.

The critical factor of Communication and forms of relationship is one of the ways in which this bond takes place. For example, in the relationship between company and user, the Communication factor must consider the provider's responsiveness, empathy, and courtesy. Furthermore, the Communication factor is fundamental for all actors. Therefore, good communication strategies are essential to maintain good relationships between actors. This class also considers the critical factors of Partnerships' development and Co-creation between actors. These factors are relevant both to ensure the maintenance of the network relationship between the service actors and contribute to the continuity of the service operation, considering the very need for Business model adaptation.

At last, another factor considered is Trust, by prioritizing mutual trust between the actors to avoid Value co-destruction. Co-destruction is a critical factor for companies in the sharing economy, which face problems related to the shared use of goods. Therefore, actions are still needed to avoid these problems and improve trust in shared use among customers. The relationships maintenance between actors through these critical factors interferes, therefore, in the user experience, since the joint action of several actors is necessary to guarantee the service quality, and consequently, the satisfaction and loyalty of customers.

Although all critical factors are related and involve all network actors, the factors groups of User experience follow-up and Service quality monitoring have a greater emphasis on the concern and consideration of the direct relationship between consumer and service provider. Already the other two factors' groups of Business model and Interaction between actors, emphasize more the company's relationship and actions with the other network actors.

Therefore, we highlight the role of companies responsible for providing carsharing services in understanding all these critical factors and how they can help the service operation's success. We also conclude that shared mobility services constitute a solution-demand network. This network is dynamic and in constant movement, formed by different actors with different capacities and interests. Thus,

the actors join the network because they understand that they can benefit from it, according to their interests, and can also add value, through co-creation and specific skills. In this way, the network functioning consists of a continuous and mutual exchange that benefits everyone.

As it is dynamic, the network undergoes constant changes. Moreover, as observed in the cases studied, there are moments in the service operation when certain actors decide to no longer be part of the network, interfering with its continuity. Therefore, these critical success factors contribute to several aspects of this network operation and maintenance. Thus, we understand that the network is not static, as its actors are not static, nor are the solutions and demands of the network. The network exists as long as there are actions and the actors' interest to join it, seeking to offer solutions for the identified demands, or adapting solutions to meet new needs.

5 FINAL CONSIDERATIONS

This thesis' last chapter presents the research's final considerations regarding fulfilling the proposed objectives and the results' contributions and implications. It also points out the limitations found in the development of this study and suggestions for future research.

5.1 ACHIEVEMENT OF THE RESEARCH OBJECTIVES

To reach the proposed general objective and answer the research question, we outlined three specific objectives. The first two specific objectives we established, to discern the main factors and identify the main actants and their interactions in the operation of carsharing services, were achieved with the conceptual-theoretical model proposition, based on the literature review. This model, composed of 5 analysis categories and 28 registration units, consisted of grouping the factors and actants identified in the operation of carsharing services.

The last specific objective, to correlate factors and actants with cases of continuity and interruption of carsharing services, was achieved during the entire process of conducting and analyzing the six case studies. Thus, the data collected through netnography and questionnaires allowed the correlation of these data with the factors and actants of the conceptual-theoretical model.

Thus, it was possible to answer the research question and achieve the general objective by determining 18 critical success factors in the operation of a carsharing service solution-demand network, which are classified into 4 groups of distinct natures (Figure 37):

- 1) User experience follow-up.
- 2) Service quality monitoring.
- 3) Business model adaptation.
- 4) Interaction between actors in the network.

The process to identify and determine these factors showed that some dynamics could only be perceived through the evolution of the understanding of what the factors are and how they interfere in the service network. Furthermore, resuming the thesis defended in this research, we verified that the 18 critical success factors we determined consider the user experience, the service quality, the business model, and the interactions between the actors in the network.

Hence, we conclude that each of the 18 critical factors is related to the others and has its critical role in the solution-demand network, with specificities that must be considered, bringing implications for all those involved in the operation of a carsharing and shared mobility service network.

5.2 RESEARCH CONTRIBUTIONS AND IMPLICATIONS

Understanding these critical factors and how they should be considered in the operation of shared mobility services can contribute to the various actors that are part of this network.

Companies providing these services can benefit from knowing which critical aspects must be considered when designing and implementing a new carsharing service. In addition, for companies already in operation, understanding the critical factors contributes to identifying aspects that deserve more attention in their service, both for diagnosis and drawing up adaptation strategies, since the critical success factors imply the company's adaptive capacity.

Users of carsharing and other shared mobility services can also benefit from identifying these critical success factors. Many of the aspects covered in the critical factors interfere in customers' relationship with service providers, like issues of communication, trust, value co-creation, or co-destruction. Furthermore, critical factors impact their journey as users, influencing satisfaction, recommendation, and service loyalty.

Thus, if provider companies pay attention to these critical factors, users will also benefit. They can enjoy a better experience by reducing problems related to user experience, service quality perception, and receiving more flexible services according to their needs.

Another group of actors that can benefit from understanding these critical success factors are support companies, suppliers, and manufacturers. Since critical factors establish the relevance of joint action between the network actors, partnerships with these support actors are increasingly important. Although they are sometimes considered secondary actors who act behind the scenes, the support companies and suppliers contribute to sustaining the service operation by the leading company, either with resources or with their technical capabilities. Therefore, understanding the critical factors in their relationship with these actors of shared mobility services can contribute to new opportunities for this group, in the demands for maintenance, the development and supply of technology, of vehicles, and agents responsible for inspection and vehicles distribution within the cities' operation area.

Finally, the group of public actors, such as governments and local authorities, can benefit from unveiling these critical factors due to the importance of forming partner networks, such as public-private partnerships. These partnerships, created to establish mutual benefits and incentives, can contribute to city halls, especially regarding urban mobility. For instance, we highlight the possibility of increasing the use of electric vehicles and the reduction of private cars in circulation. In addition to city halls, city dwellers also benefit from increased mobility alternatives and integrated use with different means of transport.

So, understanding the 18 critical success factors contributes to the entire solution-demand network of a shared mobility service. Therefore, identifying how factors are considered or not in the service operation can contribute to the dynamic process of verifying and meeting demand, designing, and adapting solutions that allow value co-creation between actors, and maintaining the service network operation.

Regarding the research implications, we understand that this study's results lead to the companies' perception that sometimes only some of the critical factors are monitored in their business. Issues related to the business model, for example, usually are a guide from the beginning. Nevertheless, often there is not the same concern to follow the evolution and adaptation of this model in the face of the various changes that the market or the customers themselves could lead. Once the service has been designed and implemented, one might think that changes are no longer needed; the service just needs to be running. However, it is precisely because of this lack of concern with constant monitoring that the problems pointed out by the critical

success factors may arise. Thus, this thesis implies that it is the set of aspects pointed out by the factors that contribute to the service's success and continuity.

Moreover, another implication of this study is the understanding that the solution-demand network that constitutes a carsharing service is dynamic. Just as products are constantly being improved and re-released in new versions, services are also continuously changing. In this sense, the shared mobility segment still faces many uncertainties. Shared mobility services require a high investment, and even the most established companies must deal with various issues related to the demand, usage, and co-destruction. Hence, it is essential to monitor and adapt solutions for current demands or identify demands to design new solutions.

5.3 RESEARCH LIMITATIONS

During this study's development, we found some limitations, particularly about data collection techniques and the data collected. One of the limitations is that it only considers the perception and opinion of carsharing users present in the online environment, particularly on Twitter and Yelp websites. Since we collected tweets and reviews from carsharing users on Twitter and Yelp, other users' perceptions, who are not included in social media, could not be considered.

Likewise, we also considered the perspective of users who are active in the online and digital environment, sharing their eWoM with others. Therefore, we did not consider the opinion of consumers who may have faced several problems in using these services but who did not disclose it online. Still regarding tweets and reviews, in the data we collected, we noticed that most comments were unfavorable, with reports of problems, complaints, and negative evaluations of the services. This may be because, on review sites, consumers tend to share their frustrations with companies. Furthermore, for some aspects of the operation of the services, we also noticed a disparity between the online data and the responses to the questionnaires. Therefore, we understand the importance of considering different data sources to understand a service or case study better.

Similarly, the questionnaires could only be answered by users who were active in the online environment since we shared them through social media. Another limitation was related to the few answers obtained for these questionnaires, considering that they were sent to users worldwide and made available in six different languages.

Another research limitation was the lack of response from the companies providing carsharing services to the questionnaires. Although we sent the questionnaire by different means to those responsible for these companies, the fact that none of them responded limited the perception of this actor in the network. Also, the fact that not all mapped city halls responded likewise limited the perceptions about public actors in public-private partnerships with shared mobility services.

5.4 SUGGESTIONS FOR FUTURE RESEARCH

As future research suggestions, we highlight the opportunity to explore the data available and produced in the digital environment on the most diverse platforms. New possibilities can be used and studied, such as collecting and analyzing through Big Data, Machine Learning, and Artificial Intelligence. Furthermore, future research can combine different data sources from various places, constituting a more extensive plurality of information sources and interpretation possibilities.

Future research may also emphasize other types of shared mobility services, designed for different audiences (B2B, P2P), and investigate other sharing economy services, such as the accommodation segment, as the critical factors may differ for these services' operation.

This research's results also improve existing tools related to product-service systems aimed at sustainability, both for diagnosing and monitoring sharing economy services. These tools can be used both by designers involved in developing such services and by managers of their provider companies.

Finally, amidst the current scenario caused by the COVID-19 pandemic, new approaches are to be explored, considering the context of the sharing economy and shared mobility services. Therefore, we observe that this scenario implies adaptations in the business model of companies providing these services, requiring

an even more significant concern with the proper hygiene of vehicles. For example, if, on the one hand, some citizens avoided shared-use services for fear of contamination, others preferred carsharing to prevent the use of public transport or contact with a driver in a taxi or Uber. Thus, this context brings new possibilities for studies of the functioning and operation of these services in a new global scenario.

Furthermore, considering an everchanging scenario, many proposals for new sharing economy services and shared mobility still do not have a pattern that allows the study of similar previous models. Therefore, another unfolding of this research is the opportunity to continue with prospective studies, adopting an abductive research logic based on a desirable future perspective.

REFERENCES

- Acquier, A., Carbone, V., and Massé, D. 2019. How to Create Value(s) in the Sharing Economy: Business Models, Scalability, and Sustainability. *Technology Innovation Management Review*, 9, 5-24. <http://dx.doi.org/10.22215/timreview/1215>.
- Akhmedova, A., Marimon, F., and Mas-Machuca, M. 2020. Winning strategies for customer loyalty in the sharing economy: a mixed-methods study. *Journal Of Business Research*, 112, 33-44. <http://dx.doi.org/10.1016/j.jbusres.2020.02.046>.
- Akhmedova, A., Mas-Machuca, M., and Marimon, F. 2020. Value co-creation in the sharing economy: The role of quality of service provided by peer. *Journal of Cleaner Production*, 266. <http://dx.doi.org/10.1016/j.jclepro.2020.121736>.
- Alemi et al. 2018. What influences travelers to use Uber? Exploring the factors affecting the adoption of on-demand ride services in California. *Travel Behaviour and Society*, 13, 88-104. <http://dx.doi.org/10.1016/j.tbs.2018.06.002>.
- Ambrosino, G., Nelson, J. D., Boero, M., and Ramazzotti, D. 2016a. From the concept of flexible mobility services to the 'shared mobility services agency'. *Transport and Sustainability*. Emerald Group Publishing Ltd. <http://dx.doi.org/10.1108/s2044-994120160000008010>.
- Ambrosino, G., Nelson, J. D., Boero, M., and Pettinelli, I. 2016b. Enabling intermodal urban transport through complementary services: From Flexible Mobility Services to the Shared Use Mobility Agency: Workshop 4. Developing inter-modal transport systems. *Research in Transportation Economics*, 59, 179-184. <http://dx.doi.org/10.1016/j.retrec.2016.07.015>.
- Ampudia-Renuncio, M., Guirao, B., and Molina-Sanchez, R. 2018. The impact of free-floating carsharing on sustainable cities: analysis of first experiences in Madrid with the university campus. *Sustainable Cities and Society*, 43, 462-475. <http://dx.doi.org/10.1016/j.scs.2018.09.019>.
- Annarelli, A., Battistella, C., and Nonino, F. 2016. Product service system: A conceptual framework from a systematic review. *Journal of Cleaner Production*, 139, 1011-1032. <http://dx.doi.org/10.1016/j.jclepro.2016.08.061>.
- Arcidiacono, D. and Pais, I. 2018. Think mobility over: A survey on car2go users in Milan. *Research for Development*, 143-159. Springer. http://dx.doi.org/10.1007/978-3-319-78099-3_10.

- Aroean, L., Dousios, D., and Michaelidou, N. 2019. Exploring interaction differences in Microblogging Word of Mouth between entrepreneurial and conventional service providers. *Computers in Human Behavior*, 95, 324-336. Elsevier BV. <http://dx.doi.org/10.1016/j.chb.2018.10.020>.
- Baek, J. S., Kim, S., Pahk, Y., and Manzini, E. 2018. A sociotechnical framework for the design of collaborative services. *Design Studies*, 55, 54-78. Elsevier BV. <http://dx.doi.org/10.1016/j.destud.2017.01.001>.
- Baraldi, E., Havensvid, M. I., Linné, Å., and Öberg, C. 2019. Start-ups and networks: Interactive perspectives and a research agenda. *Industrial Marketing Management*, 80, 58-67. <http://dx.doi.org/10.1016/j.indmarman.2018.02.002>.
- Bardhi, F. and Eckhardt, G. M. 2012. Access-Based Consumption: The Case of Car Sharing. *Journal Of Consumer Research*, 39(4), 881-898. Oxford University Press. <http://dx.doi.org/10.1086/666376>.
- Bardin, L. 2011. *Análise de conteúdo*. Edições 70, São Paulo.
- Batista, M. V. and Meyer, G. E. C. 2018. Como assim não estava no briefing? Novas perspectivas sobre o briefing no processo de design a partir da Teoria Ator-Rede. *Projetica*, 9(2), 89-106. <http://dx.doi.org/10.5433/22362207.2018v9n2suplp89>.
- Belk, R. 2007. Why Not Share Rather Than Own? *The Annals of The American Academy of Political and Social Science*, 611, 126-140. SAGE Publications. <http://dx.doi.org/10.1177/0002716206298483>.
- Belk, R. 2010. Sharing. *Journal Of Consumer Research*, 36(5), 715-734. Oxford University Press. <http://dx.doi.org/10.1086/612649>.
- Belk, R. 2014a. Sharing Versus Pseudo-Sharing in Web 2.0. *Anthropologist*, 18,7-23.
- Belk, R. 2014b. You are what you can access: Sharing and collaborative consumption online. *Journal Of Business Research*, 67(8), 1595-1600. Elsevier BV. <http://dx.doi.org/10.1016/j.ibusres.2013.10.001>.
- Benoit, S. et al. 2017. A triadic framework for collaborative consumption (CC): motives, activities and resources & capabilities of actors. *Journal of Business Research*, 79, 219-227. Elsevier BV. <http://dx.doi.org/10.1016/j.ibusres.2017.05.004>.

Bisiaux, J., Gidel, T., Huet, F., and Millet, D. 2014. How functional economy would be an environmental economy? Mode of endogenization of environmental issues in functional economy. *2014 International Conference on Engineering, Technology and Innovation (ICE)*, 1-10.

Bitner, M. J., Ostrom, A. L., and Morgan, F. N. 2008. Service Blueprinting: A Practical Technique for Service Innovation. *California Management Review*, 50(3), 66-94, SAGE Publications. <http://dx.doi.org/10.2307/41166446>.

Boons, F. and Lüdeke-Freund, F. 2013. Business models for sustainable innovation: state-of-the-art and steps towards a research agenda. *Journal Of Cleaner Production*, 45, 9-19. Elsevier BV. <http://dx.doi.org/10.1016/j.jclepro.2012.07.007>.

Boukhris, A., Fritzsche, A., and Möslin, K. 2017. Co-creation in the Early Stage of Product-service System Development. *Procedia CIRP*, 63, 27-32. <http://dx.doi.org/10.1016/j.procir.2017.03.316>.

Botsman, R., Rogers, R. 2010. *What's Mine Is Yours: The Rise of Collaborative Consumption*. Harpercollins.

Braun, Virginia et al. (2020). The online survey as a qualitative research tool. *International Journal of Social Research Methodology*, 1-16. <http://dx.doi.org/10.1080/13645579.2020.1805550>.

Bullen, C. V., and Rockart, J. F. 1981. *A Primer on Critical Success Factors*. Massachusetts Institute of Technology, Sloan School of Management, Massachusetts, USA.

Callon, M. 1986. Some elements of a sociology of translation: domestication of the scallops and the fishermen of St Brieuc Bay. In: Law, J. *Power, action, and belief: a new sociology of knowledge?* London, Routledge, 196-223.

Callon, M. 1999. Actor-Network Theory—The Market Test. *The Sociological Review*, 47, 181-195. <http://dx.doi.org/10.1111/j.1467-954x.1999.tb03488.x>.

Callon, M. 2017. *L'emprise des marchés : Comprendre leur fonctionnement pour pouvoir les changer*. Paris : La Découverte, 2017.

Car2go. 2020. Available at: <https://www.car2go.com/FR/en/joining-forces.html>. Accessed: 27 January 2020.

Casprini, E., Di Minin, A., and Paraboschi, A. 2019. How do companies organize nascent markets? The BlaBlaCar case in the inter-city shared mobility market. *Technological Forecasting and Social Change*, 144, 270-281. Elsevier BV. <http://dx.doi.org/10.1016/j.techfore.2018.01.012>.

Catulli, M. 2012. What uncertainty? *Journal of Manufacturing Technology Management*, 23, 780-793, Emerald. <http://dx.doi.org/10.1108/17410381211253335>.

Chang, W.-L., and Wang, J.-Y. 2018. Mine is yours? Using sentiment analysis to explore the degree of risk in the sharing economy. *Electronic Commerce Research and Applications*, 28, 141-158. <http://dx.doi.org/10.1016/j.elerap.2018.01.014>.

Cheng, M. 2016. Sharing economy: A review and agenda for future research. *International Journal of Hospitality Management*, 57, 60-70. Elsevier BV. <http://dx.doi.org/10.1016/j.ijhm.2016.06.003>.

Cheng, X., Fu, S., and De Vreede, G. J. 2018. A mixed method investigation of sharing economy driven car-hailing services: Online and offline perspectives. *International Journal of Information Management*, 41, 57-64. Elsevier BV. <http://dx.doi.org/10.1016/j.ijinfomgt.2018.03.005>.

Cherubini, S., Iasevoli, G., and Michelini, L. 2015. Product-service systems in the electric car industry: critical success factors in marketing. *Journal Of Cleaner Production*, 97, 40-49. Elsevier BV. <http://dx.doi.org/10.1016/j.jclepro.2014.02.042>.

Chiariotti, F., Pielli, C., Zanella, A., and Zorzi, M. 2018. A Dynamic Approach to Rebalancing Bike-Sharing Systems. *Sensors*, 18, 512-534. <http://dx.doi.org/10.3390/s18020512>.

Chowdhury, S. 2017. Co-creation of e-services enabled by the digitalization of physical products. *Journal of Information Systems and Technology Management : JISTEM*, 14, 219-237.

Contreras, S. D., and Paz, A. 2018. The effects of ride-hailing companies on the taxicab industry in Las Vegas, Nevada. *Transportation Research Part A: Policy and Practice*, 115, 63-70. Elsevier BV. <http://dx.doi.org/10.1016/j.tra.2017.11.008>.

Couzineau-Zegwaard, E., and Meier, O. 2018. Carsharing and innovation through the prism of actor network theory. *Journal of Innovation Economics & Management*, 37-67.

Conselho Nacional de Desenvolvimento Científico e Tecnológico. *Directorio do Grupos de Pesquisa*. Available at: <http://dgp.cnpq.br/dgp/espelhogrupo/20568>. Accessed: 05 May 2021.

Cova, B. 1995. *Au-delà du marché* : quand le lien importe plus que le bien. Paris : L'Harmattan.

Coxon, S., Napper, R., and Richardson, M. 2019. Chapter 7 - Transforming Future Mobility. In: Coxon, S., Napper, R., and Richardson, M. (eds.) *Urban Mobility Design*, 179-214. Elsevier. <http://dx.doi.org/10.1016/b978-0-12-815038-2.00007-4>.

Cronin, J. J. and Taylor, S. A. 1994. SERVPERF versus SERVQUAL: Reconciling Performance-Based and Perceptions-Minus-Expectations Measurement of Service Quality. *Journal of Marketing*, 58(1), 125-131. <http://dx.doi.org/10.2307/1252256>.

Csonka, B., and Csiszar, C. 2016. Service Quality Analysis and Assessment Method for European Carsharing Systems. *Periodica Polytechnica; Transportation Engineering*, 44, 80-88. <http://dx.doi.org/10.3311/pptr.8559>.

Currie, G. and Merkert, R. 2016. Workshop 1 report: Innovations in Service Delivery and Performance Management. *Research in Transportation Economics*, 59, 7-10. Elsevier BV. <http://dx.doi.org/10.1016/j.retrec.2016.10.005>.

Dancer, H., Filieri, R., Grundy, D. 2014. EWOM in online customer support communities: key variables in information quality and source credibility. *Journal Of Direct, Data and Digital Marketing Practice*, 15(4), 290-305, abr. 2014. Springer Science and Business Media LLC. <http://dx.doi.org/10.1057/dddmp.2014.21>.

Dowling, R., Kent, J. 2015. Practice and public-private partnerships in sustainable transport governance: The case of car sharing in Sydney, Australia. *Transport Policy*, 40, 58-64, Elsevier BV. <http://dx.doi.org/10.1016/j.tranpol.2015.02.007>.

Dowling, R., Maalsen, S., and Kent, J. L. 2018. Sharing as sociomaterial practice: Car sharing and the material reconstitution of automobility. *Geoforum*, 88, 10-16. Elsevier BV. <http://dx.doi.org/10.1016/j.geoforum.2017.11.004>.

Elo, S. and Kyngäs, H. 2008. The qualitative content analysis process. *Journal Of Advanced Nursing*, 62, 107-115. <http://dx.doi.org/10.1111/j.1365-2648.2007.04569.x>.

Erlingsson, C. and Brysiewicz, P. 2017. A hands-on guide to doing content analysis. *African Journal of Emergency Medicine*, 7, 93-99, Elsevier BV. <http://dx.doi.org/10.1016/j.afjem.2017.08.001>.

- Ferguson, C. R. and Dickinson, R. 1982. Critical success factors for directors in the eighties. *Business Horizons*, 25, 14-18, Elsevier BV. [http://dx.doi.org/10.1016/0007-6813\(82\)90123-9](http://dx.doi.org/10.1016/0007-6813(82)90123-9).
- Ferrero, F., Perboli, G., Rosano, M. and Vesco, A. 2018. Car-sharing services: An annotated review. *Sustainable Cities and Society*, 37, 501-518. Elsevier BV. <http://dx.doi.org/10.1016/j.scs.2017.09.020>.
- Field, J.M., Victorino, L., Buell, R.W., Dixon, M.J., Meyer Goldstein, S., Menor, L.J., Pullman, M.E., Roth, A.V., Secchi, E., and Zhang, J.J. 2018. Service operations: what's next? *Journal of Service Management*, 29, 55-97. Emerald. <https://doi.org/10.1108/JOSM-08-2017-0191>.
- Gallarza, M. G., Gil-Saura, I., and Holbrook, M. B. 2011. The value of value: further excursions on the meaning and role of customer value. *Journal Of Consumer Behaviour*, 10, 179-191. Wiley. <http://dx.doi.org/10.1002/cb.328>.
- Gargiulo, E., Giannantonio, R., Guercio, E., Borean, C., and Zenezini, G. 2015. Dynamic Ride Sharing Service: Are Users Ready to Adopt it? *Procedia Manufacturing*, 3, 777-784. <http://dx.doi.org/10.1016/j.promfg.2015.07.329>.
- Gates, D. 2007. 'Seattle's Flexcar merges with rival Zipcar', Seattle Times, 31 October. Available at: <https://www.seattletimes.com/business/seattles-flexcar-merges-with-rival-zipcar/>. (Accessed: 10 February 2020).
- Gidel, T., Huet, F., and Bisiaux, J. 2016. Functional analysis and functional economy: close and yet so far? In: Ventura, A. (Org.). *Challenges of functionality for Eco-Design, Crossed visions of functionality from various disciplines*. Paris: Presses Des Mines, 39-48.
- Gil, A. C. 2010. *Como elaborar projetos de pesquisa*. 5. ed. Atlas: São Paulo.
- Gilibert, M., Ribas, I., and Rodriguez-Donaire, S. 2019. Study of on-demand shared ride-hailing commuting service: first results from a case study in Barcelona. *Urban Transport XXIV*, 121-128. WIT Press. <http://dx.doi.org/10.2495/ut180121>.
- Glantz-Richter, M. 2016. Reclaim Street Space! – Exploit the European Potential of Car Sharing. *Transportation Research Procedia*, 14, 1296-1304. Elsevier BV. <http://dx.doi.org/10.1016/j.trpro.2016.05.202>.
- Gortz, M. 2017. *O Design Emocional nas redes de solução-demanda da Economia da Funcionalidade*. Master thesis, Federal University of Technology, Curitiba-PR, Brazil. Available at: <https://repositorio.utfpr.edu.br/jspui/handle/1/2869>.

Goedkoop, M. J. et al. 1999. Product Service Systems, ecological and economic basics. Report No. 1999/36, submitted for Dutch Ministries of Environment (VROM) and Economic Affairs (EZ), Available at: https://www.researchgate.net/publication/293825611_Product_Service_systems_Ecological_and_Economic_Basics. (Accessed: 28 October 2019).

Granovetter, Mark. 1983. The Strength of Weak Ties: A Network Theory Revisited. *Sociological Theory*, 1, 1360-1380. <http://dx.doi.org/10.2307/202051>.

Grieger, M. and Ludwig, A. 2018. On the move towards customer-centric business models in the automotive industry – a conceptual reference framework of shared automotive service systems. *Electronic Markets*, 1-28, Springer Nature. <http://dx.doi.org/10.1007/s12525-018-0321-6>.

Grönroos, C. 1984. A Service Quality Model and its Marketing Implications. *European Journal of Marketing*, 18, 36-44. Emerald. <http://dx.doi.org/10.1108/eum000000004784>.

Grönroos, C. and Voima, P. 2012. 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>.

Guyader, H. and Piscicelli, L. 2019. Business model diversification in the sharing economy: The case of GoMore. *Journal of Cleaner Production*, 215, 1059-1069. Elsevier BV. <http://dx.doi.org/10.1016/j.jclepro.2019.01.114>.

Hamari, J., Sjöklint, M., Ukkonen, A. 2015. The sharing economy: Why people participate in collaborative consumption. *Journal of the Association for Information Science and Technology*, 67, 2047-2059. Wiley. <http://dx.doi.org/10.1002/asi.23552>.

Hawkins, A. J. 2019. 'Share Now, formerly Car2Go, is leaving North America', The Verge, 18 Dec. Available at: <https://www.theverge.com/2019/12/18/21028517/sharenow-car2go-leaving-north-america-bmw-daimler-cities-date>. (Accessed: 27 January 2020).

Heinonen, K. and Strandvik, T. 2018. Reflections on customers' primary role in markets. *European Management Journal*, 36, 1-11. Elsevier BV. <http://dx.doi.org/10.1016/j.emj.2017.09.005>.

Henten, A. H. and Windekilde, I. M. 2016. Transaction costs and the sharing economy. *Info*, 18, 1-15, 11. Emerald. <http://dx.doi.org/10.1108/info-09-2015-0044>.

Holbrook, M. B. 2006. Consumption experience, customer value, and subjective personal introspection: an illustrative photographic essay. *Journal of Business Research*, 59, 714-725, Elsevier BV. <http://dx.doi.org/10.1016/j.jbusres.2006.01.008>.

Hu, X. 2019. B2C Relationship Quality in the Sharing Economy in the Chinese Context. In: Zheng, P., Crawford, D., Reyes-Munoz, A., and Callaghan, V. (eds.). EAI International Conference on Technology, Innovation, Entrepreneurship and Education. TIE 2017. Lecture Notes in Electrical Engineering, vol 532. Springer, Cham. https://doi.org/10.1007/978-3-030-02242-6_21.

Huang, S-L. and Kuo, M-Y. 2020. Critical success factors in the sharing economy: a customer perspective. *Service Business*, 14, 553-576. Springer Science and Business Media LLC. <http://dx.doi.org/10.1007/s11628-020-00426-5>.

Huet, F. and Choplin, H. 2012. L'economie de fonctionnalite comme economie de cooperation: le cas du developpement de logiciels. *Projectics / Proy ctica / Projectique*, 11(2), 111-122.

Inturri, G., Le Pira, M., Giuffrida, N., Ignaccolo, M., Pluchino, A., Rapisarda, A. and D'angelo, R. 2019. Multi-agent simulation for planning and designing new shared mobility services. *Research in Transportation Economics*, 73, 34-44. Elsevier BV. <http://dx.doi.org/10.1016/j.retrec.2018.11.009>.

Islam, J. U., Hollebeek, L. D., Rahman, Z., Khan, I., and Rasool, A. 2019. Customer engagement in the service context: An empirical investigation of the construct, its antecedents, and consequences. *Journal of Retailing and Consumer Services*, 50, 277-285. Elsevier BV. <http://dx.doi.org/10.1016/j.jretconser.2019.05.018>.

Javaid A. and Kohda Y. (2019) Exploring the Role of Service Eco-system in Developing Countries: A Case Study of Ride Hailing Service in Pakistan. In: Kantola J.I., Nazir S., and Barath T. (eds) Advances in Human Factors, Business Management and Society. AHFE 2018. *Advances in Intelligent Systems and Computing*, vol 783. Springer, Cham. https://doi.org/10.1007/978-3-319-94709-9_28.

Kamargianni, M., Li, W., Matyas, M. and Sch fer, A. 2016. A Critical Review of New Mobility Services for Urban Transport. *Transportation Research Procedia*, 14, 3294-3303. Elsevier BV. <http://dx.doi.org/10.1016/j.trpro.2016.05.277>.

Kozinets, R. V. 2002. The field behind the screen: Using netnography for marketing research in online communities. *Journal of Marketing Research*, 39, 61-72.

Krippendorff, K. 2004. *Content Analysis: An Introduction to Its Methodology*. 2. ed. Sage Publications: Thousand Oaks.

- Kumar, V., Lahiri, A., and Dogan, O. B. 2018. A strategic framework for a profitable business model in the sharing economy. *Industrial Marketing Management*, 69, 147-160. Elsevier BV. <http://dx.doi.org/10.1016/j.indmarman.2017.08.021>.
- Lacerda, R. T. O., Ensslin, L., and Ensslin, S. R. 2012. Uma análise bibliométrica da literatura sobre estratégia e avaliação de desempenho. *Gest. Prod.*, 19, 59-78.
- Laczko, P., Hullova, D., Needham, A., Rossiter, A.-M., and Battisti, M. 2019. The role of a central actor in increasing platform stickiness and stakeholder profitability: Bridging the gap between value creation and value capture in the sharing economy. *Industrial Marketing Management*, 76, 214-230. Elsevier BV. <http://dx.doi.org/10.1016/j.indmarman.2018.08.010>.
- Lagadic, M., Verloes, A., and Louvet, N. 2019. Can carsharing services be profitable? A critical review of established and developing business models. *Transport Policy*, 77, 68-78. <http://dx.doi.org/10.1016/j.tranpol.2019.02.006>.
- Lakatos, E. M. and Marconi, M. A. 2003. *Fundamentos de metodologia científica*. 5. ed. Atlas: São Paulo.
- Latour, B. 1996. On actor-network theory: A few clarifications. *Soziale Welt* 47. Jahrg., H. 4, 369-381.
- Latour, B. 2005. *Reassembling the Social: An Introduction to Actor-Network-Theory*. Oxford University Press: Oxford.
- Law, J. 1992. Notes on the theory of the actor-network: ordering, strategy, and heterogeneity, *Systems Practices*, 5, 379-393.
- Lee, S-H., Lee, B-Y., and Kim, H-W. 2019. Decisional factors leading to the reuse of an on-demand ride service. *Information & Management*, 56, 493-506. Elsevier BV. <http://dx.doi.org/10.1016/j.im.2018.09.010>.
- Leidecker, J. K. and Bruno, A. V. 1984. Identifying and Using Critical Success Factors. *Long Range Planning*, 17, 23-32.
- Le Pira, M., Marcucci, E., Gatta, V. et al. 2017. Towards a decision-support procedure to foster stakeholder involvement and acceptability of urban freight transport policies. *European Transport Research Review*, 9(4), 1-14, Springer Nature.

Lesteven, G. and Leurent, F. 2016. Electromobility for Tourists: Testing Business Models in the Paris Region. *Transportation Research Procedia*, 19, 164-175. Elsevier BV. <http://dx.doi.org/10.1016/j.trpro.2016.12.077>.

Li, D., Liu, G., Jia, F., and Sun, H. 2019. Sharing economy–based service triads: Towards an integrated framework and a research agenda. *Journal of Cleaner Production*, 218, 1031-1044. <http://dx.doi.org/10.1016/j.jclepro.2019.02.019>.

Li, Y., Taeihagh, A. & Jong, M. de. 2018. The Governance of Risks in Ridesharing: A Revelatory Case from Singapore. *Energies*, 11(5), 1277. <http://dx.doi.org/10.3390/en11051277>.

Liang, L. J., Choi, H. C., and Joppe, M. 2018. Exploring the relationship between satisfaction, trust and switching intention, repurchase intention in the context of Airbnb. *International Journal of Hospitality Management*, 69, 41-48. <http://dx.doi.org/10.1016/j.ijhm.2017.10.015>.

Lima, L. A. 2011. A Representação das Múltiplas Dimensões Paradigmáticas no Estudo da Administração: um ensaio sobre os limites contidos nas defesas paradigmáticas excludentes. *RAC*, Curitiba, 15(2), 198-208.

Lusch, R. F., Vargo, S. L., and O'Brien, M. 2007. Competing through service: insights from service-dominant logic. *Journal of Retailing*, 83(1), 5-18. Elsevier BV. <http://dx.doi.org/10.1016/j.jretai.2006.10.002>.

Maioli, H. C., Carvalho, R. C., and Medeiros, D. D. 2019. SERVBIKE: Riding customer satisfaction of bicycle sharing service. *Sustainable Cities and Society*, 50, 1-7, out. 2019. Elsevier BV. <http://dx.doi.org/10.1016/j.scs.2019.101680>.

Marimon, F., Mas-Machuca, M. and Llach, J. 2020. Making the long and adventurous journey from quality to loyalty. *Total Quality Management & Business Excellence*, 1-19. <http://dx.doi.org/10.1080/14783363.2020.1770077>.

Marshall, M. N. 1996. Sampling for qualitative research. *Family Practice*, 13(6), 522-526, Oxford University Press. <http://dx.doi.org/10.1093/fampra/13.6.522>.

Martin, E. and Shaheen, S. 2016. The Impacts of Car2go on Vehicle Ownership, Modal Shift, Vehicle Miles Traveled, and Greenhouse Gas Emissions: An Analysis of Five North American Cities. In: *Transportation Sustainability Research Center, Report*. UC Berkeley 3.

Martins, J. C. and Belfo, F. P. 2010. Métodos de Investigação qualitativa: Estudos de Casos na Investigação em Sistemas de Informação. *Proelium*, 14(1), 39-71.

Mattar, F. N. 1996. *Pesquisa de Marketing*. São Paulo: Atlas.

Mattia, G., Mugion, R. G., and Principato, L. 2019. Shared mobility as a driver for sustainable consumptions: The intention to re-use free-floating car sharing. *Journal of Cleaner Production*, 237, 1-10. <http://dx.doi.org/10.1016/j.jclepro.2019.06.235>.

Mcfarland, M. 2020. 'Zipcar's customer service outrages its users, draws backlash', CNN Business, 14 July. Available at: <https://edition.cnn.com/2020/07/14/tech/zipcar-customer-service/index.html>. (Accessed: 03 March 2021).

Merfeld, K., Wilhelms, M-P., Henkel, S. & Kreutzer, K. 2019. Carsharing with shared autonomous vehicles: Uncovering drivers, barriers, and future developments – A four-stage Delphi study. *Technological Forecasting and Social Change*, 144, 66-81. Elsevier BV. <http://dx.doi.org/10.1016/j.techfore.2019.03.012>.

Miramontes, M., Pfertner, M., Rayaprolu, H. S., Schreiner, M., and Gebhard, W. 2017. Impacts of a multimodal mobility service on travel behavior and preferences: user insights from Munich's first Mobility Station. *Transportation*, 44, 1325-1342. Springer Nature. <http://dx.doi.org/10.1007/s11116-017-9806-y>.

Moher, D., Shamseer, L., Clarke, M. et al. 2015. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Syst Rev*, 4(1). <https://doi.org/10.1186/2046-4053-4-1>

Möhlmann, M. 2015. Collaborative consumption: Determinants of satisfaction and the likelihood of using a sharing economy option again. *Journal of Consumer Behaviour*, 14(3), 193-207. <http://dx.doi.org/10.1002/cb.1512>.

Moobie. 2020. Available at: <https://moobie.com.br>. Accessed: 14 February 2020.

Mont, O. 2002. Clarifying the Concept of Product Service-Systems. *Journal of Cleaner Production*, 10, 237-245. Elsevier BV

Mont, O. and Plepys, A. 2003. Customer satisfaction: review of literature and application to the product-service systems. *Final report to the Society for Non-Traditional Technology*, Japan. Available at: [https://portal.research.lu.se/portal/en/publications/customer-satisfaction-review-of-literature-and-application-to-the-productservice-systems\(08d99a00-ac08-4507-b134-46ff8ed7ed19\)/export.html#export](https://portal.research.lu.se/portal/en/publications/customer-satisfaction-review-of-literature-and-application-to-the-productservice-systems(08d99a00-ac08-4507-b134-46ff8ed7ed19)/export.html#export). (Accessed: 14 June 2021).

Moritz, S. 2005. *Service Design: Practical access to an evolving field*. PhD thesis, Köln International School of Design, Köln.

- Morton, C. 2018. Appraising the market for bicycle sharing schemes: Perceived service quality, satisfaction, and behavioural intention in London. *Case Studies on Transport Policy*, 6(1), 102-111. <http://dx.doi.org/10.1016/j.cstp.2017.11.003>.
- Muñoz, P. and Cohen, B. 2017. Mapping out the sharing economy: A configurational approach to sharing business modeling. *Technological Forecasting and Social Change*, 125, 21-37. Elsevier BV. <http://dx.doi.org/10.1016/j.techfore.2017.03.035>.
- Murillo, D., Buckland, H., and Val, E. 2017. When the sharing economy becomes neoliberalism on steroids: Unravelling the controversies. *Technological Forecasting and Social Change*, 125, 66-76. <http://dx.doi.org/10.1016/j.techfore.2017.05.024>.
- Nascimento, D. E. 2001. *Mobilisation et coordination d'un réseau socio-techno-économique dans une nouvelle frontière de développement industriel: L'étude de cas Tocantins- Brésil*. PhD thesis, Université de Technologie de Compiègne, Compiègne.
- Niemimaa, M., Järveläinen, J., Heikkilä, M. & Heikkilä, J. 2019. Business continuity of business models: Evaluating the resilience of business models for contingencies. *International Journal of Information Management*, 49, 208-216. Elsevier BV. <http://dx.doi.org/10.1016/j.ijinfomgt.2019.04.010>.
- Ojasalo, J. and Kauppinen, H. 2016. Collaborative Innovation with External Actors: An Empirical Study on Open Innovation Platforms in Smart Cities. *Technology Innovation Management Review*, 6, 49-60.
- Ollaik, L. G. and Ziller, H. M. 2012. Concepções de validade em pesquisas qualitativas. *Educação e Pesquisa*, 38(1), 229-241.
- Omicore. 2021. 'Twitter by the Numbers: Stats, Demographics & Fun Facts', 03 January. Available at: <https://www.omicoreagency.com/twitter-statistics/>. (Accessed: 14 February 2021).
- Organização para a Cooperação e Desenvolvimento Económico – OCDE. 2007. *Manual de Frascati*. Gráfica de Coimbra: Coimbra.
- Osterwalder, A. and Pigneur, Y. 2010. *Business Model Generation: A handbook for visionaries, game changers and challengers*. New Jersey: John Wiley and Sons, Inc., Hoboken.
- Ostrom, A. L., Parasuraman, A., Bowen, D. E., Patrício, L., and Voss, C. A. 2015. Service Research Priorities in a Rapidly Changing Context. *Journal Of Service Research*, 18(2), 127-159. SAGE. <http://dx.doi.org/10.1177/1094670515576315>.

Pagani, R.N., Kovaleski, J.L. and Resende, L.M. 2015. Methodi Ordinatio: a proposed methodology to select and rank relevant scientific papers encompassing the impact factor, number of citations, and year of publication. *Scientometrics*, 105(3), 2109–2135. <https://doi.org/10.1007/s11192-015-1744-x>.

Parasuraman, A., Zeithaml, Valarie A., and Berry, Leonard L. 1985. A Conceptual Model of Service Quality and Its Implications for Future Research. *Journal Of Marketing*, 49(4), 41-50. SAGE Publications. <http://dx.doi.org/10.2307/1251430>.

Parasuraman, A., Zeithaml, Valarie A., and Berry, Leonard L. 1988. SERVQUAL: a multiple-item scale for measuring consumer perceptions of service quality. *Journal of Retailing*, 64(1), 12-40.

Parasuraman, A., Zeithaml, Valarie A., and Malhotra, Arvind. 2005. E-S-QUAL. *Journal Of Service Research*, 7(3), 213-233. SAGE Publications. <http://dx.doi.org/10.1177/1094670504271156>.

Parolin, C. F. 2018. *Consumo pós-moderno de experiências turísticas em comunidades de comunicação on-line (e-WoM)*. PhD thesis, Universidade do Vale do Itajaí, Biguaçu-SC, Brazil.

Park, H. 2011. *The Role of Social Network Websites in Consumer-Brand Relationship*. PhD thesis, University of Tennessee, Knoxville.

Park, J. and Ramaprasad, A. 2018. Toward ontology of designer-user interaction in the design process: a knowledge management foundation. *Journal of Knowledge Management*, 22(1), 201-218. Emerald. <http://dx.doi.org/10.1108/jkm-06-2017-0220>.

Pearce, S. R. 2016. *Self-service systems design for efficiency and effectiveness : An empirical study*. 10309022 Ph.D., University of Surrey (United Kingdom).

Perboli, G., Ferrero, F., Musso, S., and Vesco, A. 2018. Business models and tariff simulation in car-sharing services. *Transportation Research Part A: Policy and Practice*, 115, 32-48. Elsevier BV. <http://dx.doi.org/10.1016/j.tra.2017.09.011>.

Pine, B. J. and Gilmore, J. H. 2013. The experience economy: past, present, and future. *Handbook on the Experience Economy*, 21-44. Edward Elgar Publishing. <http://dx.doi.org/10.4337/9781781004227.00007>.

Powell, W. W. 1991. Neither market nor hierarchy: networks forms of organization. In: Thompson, G. et al. (Ed.). *Markets, Hierarchies & Networks: The Coordination of Social Life*. London: Sage Publications.

Prahalad, C. K. and Ramaswamy, V. 2004. Co-creation experiences: the next practice in value creation. *Journal of Interactive Marketing*, 18(3), 5-14. Elsevier BV. <http://dx.doi.org/10.1002/dir.20015>.

Qu, M., Yu, S. and Yu, M. 2017. An improved approach to evaluate car sharing options. *Ecological Indicators*, 72, 686-702. Elsevier BV. <http://dx.doi.org/10.1016/j.ecolind.2016.07.018>.

Ramos, A., Faria, P. M., and Faria, A. 2014. Revisão sistemática de literatura: contributo para a inovação na investigação em ciências da educação. *Revista Diálogo Educacional*, 14(41). <http://dx.doi.org/10.7213/dialogo.educ.14.041.ds01>

Rayle, L., Dai, D., Chan, N., Cervero, R., and Shaheen, S. 2016. Just a better taxi? A survey-based comparison of taxis, transit, and ridesourcing services in San Francisco. *Transport Policy*, 45, 168-178. Elsevier BV. <http://dx.doi.org/10.1016/j.tranpol.2015.10.004>.

Reim, W., Parida, V., and Örtqvist, D. 2015. Product–Service Systems (PSS) business models and tactics – a systematic literature review. *Journal of Cleaner Production*, 97, 61-75. Elsevier BV. <http://dx.doi.org/10.1016/j.jclepro.2014.07.003>.

Rifkin, J. 2001. *The Age of Access: The New Culture of Hypercapitalism, where all of Life is a Paid-For Experience*. New York: Tarcherperigee.

Ritter, M. and Schanz, H. 2019. The sharing economy: A comprehensive business model framework. *Journal of Cleaner Production*, 213, 320-331. Elsevier BV. <http://dx.doi.org/10.1016/j.jclepro.2018.12.154>.

Roy, S. K., Shekhar, V., Lassar, W. M. & Chen, T. 2018. Customer engagement behaviors: The role of service convenience, fairness and quality. *Journal of Retailing and Consumer Services*, 44, 293-304. Elsevier BV. <http://dx.doi.org/10.1016/j.jretconser.2018.07.018>

Ruthes, S. and Silva, C. L. 2015. O uso de estudos prospectivos na análise de políticas públicas: uma análise bibliométrica. In: *Congresso Latino-Iberoamericano de Gestão da Tecnologia, Altec*, 1-19.

Santos, A. 2018. Introdução. In: Santos, A. (org.). *Seleção do método de pesquisa: guia para pós-graduando em design e áreas afins*. Curitiba: Editora Insight, 9-19.

Santos, A. et al. 2018. Estudo de caso. In: Santos, A. (org.). *Seleção do método de pesquisa: guia para pós-graduando em design e áreas afins*. Curitiba: Editora Insight, 91-108.

Scientific Journal Rankings. 2018. Available at:
<https://www.scimagojr.com/journalrank.php>. (Accessed: 10 June 2021).

Shaheen, S. A., Chan, N. D., and Micheaux, H. 2015. One-way carsharing's evolution and operator perspectives from the Americas. *Transportation*, 42(3), 519-536. <http://dx.doi.org/10.1007/s11116-015-9607-0>.

Shaheen, S. A., and Chan, N. 2016. Mobility and the Sharing Economy: Potential to Facilitate the First- and Last-Mile Public Transit Connections. *Built Environment*, 42(4), 573-588.

Silalahi, S. L. B., Handayani, P. W., and Munajat, Q. 2017. Service Quality Analysis for Online Transportation Services: Case Study of GO-JEK. *Procedia Computer Science*, 124, 487-495. Elsevier BV. <http://dx.doi.org/10.1016/j.procs.2017.12.181>.

Silva, A. K. D. 2019. *Modelos de negócio adotados por empresas de compartilhamento de carros no contexto da mobilidade inteligente: estudos de caso múltiplos em empresas que atuam no Brasil*. PhD thesis, Universidade de São Paulo, São Paulo.

Silva, E. L., and Menezes, E. M. 2005. *Metodologia da pesquisa e elaboração de dissertação*. 4 ed. rev. atual. Florianópolis.

Smith, A. M. 2013. The value co-destruction process: a customer resource perspective. *European Journal of Marketing*, 47, 1889-1909, Emerald.
<http://dx.doi.org/10.1108/ejm-08-2011-0420>.

Somers, L., Dewit, I., and Baelus, C. 2018. Understanding product-service systems in a sharing economy context – A literature review. *Procedia CIRP*, 73, 173-178.

Sopjani, L., Stier, J. J., Ritzén, S., Hesselgren, M., and Georén, P. 2019. Involving users and user roles in the transition to sustainable mobility systems: The case of light electric vehicle sharing in Sweden. *Transportation Research Part D: Transport and Environment*, 71, 207-221. <http://dx.doi.org/10.1016/j.trd.2018.12.011>.

Spurlock, C. A., Sears, J., Wong-Parodi, G., Walker, V., Jin, L., Taylor, M., Duvall, A., Gopal, A., and Todd, A. 2019. Describing the users: Understanding adoption of and interest in shared, electrified, and automated transportation in the San Francisco Bay Area. *Transportation Research Part D: Transport and Environment*, 71, 283-301.
<http://dx.doi.org/10.1016/j.trd.2019.01.014>.

Stabauer, P. 2018. Value networks as critical success factor for smart service business models. Manchester: The International Society for Professional Innovation Management (ISPIM).

Stahel, W. R. 1997. The functional economy: cultural and organizational change. In: Richards (Ed.), *The Industrial Green Game*. National Academy Press, Washington DC, 1997. Available at: <http://www.product-life.org/en/archive/the-functional-economy-cultural-and-organizational-change>. (Accessed: 28 October 2019).

Stahel, W. R. 2016. The circular economy. *Nature*, 531(7595), 435-438. Springer Science and Business Media LLC. <http://dx.doi.org/10.1038/531435a>.

Sthapit, E. and Björk, P. 2019. Sources of value co-destruction: Uber customer perspectives. *Tourism Review*. 74(4), 780-794, Emerald. <http://dx.doi.org/10.1108/tr-12-2018-0176>.

Stickdorn, M. and Schneider, J. 2010. *This is Service Design Thinking: Basics-Tools-Cases*. S.L.: Bis Publishers.

Stocker, A. and Shaheen, S. P. 2016. *Shared Automated Vehicles: Review of Business Models*. Paris: Organisation for Economic Cooperation and Development.

Storni, C., Binder, T., Linde, P., and Stuedahl, D. 2015. Designing things together: intersections of co-design and actor-network theory. *Codesign*, 11, 149-151. <http://dx.doi.org/10.1080/15710882.2015.1081442>.

Suri, A., Huang, B., Sénécal, S. 2019. I Can Forgive You, But I Can't Forgive the Firm: an examination of service failures in the sharing economy. *Journal of Marketing Theory and Practice*, 27(4), 355-370. <http://dx.doi.org/10.1080/10696679.2019.1644958>.

Ta, H., Esper, T. L., and Hofer, A. R. 2018. Designing crowdsourced delivery systems: The effect of driver disclosure and ethnic similarity. *Journal of Operations Management*, 60, 19-33. <http://dx.doi.org/10.1016/j.jom.2018.06.001>.

Tankovska, H. 2021. 'Leading countries based on number of Twitter users as of January 2021', Statista, 09 February. Available at : <https://www.statista.com/statistics/242606/number-of-active-twitter-users-in-selected-countries/>. (Accessed: 26 April 2021).

Taveira, K. V. M. et al. 2018. Diagnostic validity of methods for assessment of swallowing sounds: a systematic review. *Brazilian journal of otorhinolaryngology*, 84(5), 638-652.

- Terrien, C., Maniak, R., Chen, B., and Shaheen, S. 2016. Good practices for advancing urban mobility innovation: A case study of one-way carsharing. *Research in Transportation Business & Management*, 20, 20-32. Elsevier BV. <http://dx.doi.org/10.1016/j.rtbm.2016.08.001>.
- Thompson et al. 1991. Introduction. In: Thompson, Grahame et al. (Ed.). *Markets, Hierarchies & Networks: The Coordination of Social Life*. 1-10.
- Treinta, F. T. et al. 2013. Metodologia de pesquisa bibliográfica com a utilização de método multicritério de apoio à decisão. *Production*, 24(3), 508-520. <http://dx.doi.org/10.1590/s0103-65132013005000078>.
- Tukker, A. 2004. Eight types of product–service system: eight ways to sustainability? Experiences from SusProNet. *Business Strategy And The Environment*, 13(4), 246-260.
- Turetken, O., Grefen, P., Gilsing, R., and Adali, O. E. 2019. Service-Dominant Business Model Design for Digital Innovation in Smart Mobility. *Business & Information Systems Engineering*, 61, 9-29. Springer Nature. <http://dx.doi.org/10.1007/s12599-018-0565-x>.
- Uber. 2020. Available at: <https://www.uber.com/br/pt-br/>. (Accessed 14 February 2020).
- Uber Newsroom. 2020. A história da Uber. Available at: <https://www.uber.com/pt-BR/newsroom/hist%C3%B3ria/>. (Accessed 14 February 2020).
- Vandermerwe, S. and Rada, J. 1988. Servitization of business: Adding value by adding services. *European Management Journal*, 6(4), 314-324. Elsevier BV. [http://dx.doi.org/10.1016/0263-2373\(88\)90033-3](http://dx.doi.org/10.1016/0263-2373(88)90033-3).
- Vargo, S. L. and Lusch, R. F. 2004a. Evolving to a New Dominant Logic for Marketing. *Journal Of Marketing*, 68(1), 1-17.
- Vargo, S. L. and Lusch, R. F. 2004b. The Four Service Marketing Myths. *Journal Of Service Research*, 6(4), 324-335. SAGE Publications.
- Vargo, S. L. and Lusch, R. F. 2017. Service-dominant logic 2025. *International Journal of Research in Marketing*, 34, 46-67. Elsevier BV.
- Vasques, R. A. 2015. *Posse e uso compartilhado: Reflexões e práticas*. PhD thesis, Universidade de São Paulo, São Paulo.

Vecchio, G. and Tricarico, L. 2019. "May the Force move you": Roles and actors of information sharing devices in urban mobility. *Cities*, 88, 261-268. Elsevier BV. <http://dx.doi.org/10.1016/j.cities.2018.11.007>.

Vezzoli, C., Ceschin, F., Diehl, J. C. & Kohtala, C. 2015. New design challenges to widely implement 'Sustainable Product–Service Systems'. *Journal of Cleaner Production*, 97, 1-12. Elsevier BV. <http://dx.doi.org/10.1016/j.jclepro.2015.02.061>.

Vij, A. 2019. Understanding consumer demand for new transport technologies and services, and implications for the future of mobility. *Data-driven Multivalence in the Built Environment*, 91-107. Springer International Publishing. http://dx.doi.org/10.1007/978-3-030-12180-8_5.

Vine, S. L., Adamou, O., and Polak, J. 2014. Predicting new forms of activity/mobility patterns enabled by shared-mobility services through a needs-based stated-response method: Case study of grocery shopping. *Transport Policy*, 32, 60-68. Elsevier BV. <http://dx.doi.org/10.1016/j.tranpol.2013.12.008>.

Wang, R., Lian, X., and Zhao, D. 2019. Feedback Elicitation Mechanism Design. *IEEE Access*, 7, 73656-73665. <http://dx.doi.org/10.1109/access.2019.2919999>.

Wielinski, G., Trépanier, M., and Morency, C. 2017. Carsharing versus bikesharing: Comparing mobility behaviors. *Transportation Research Record*, 2650(1), 112-122, SAGE Publications. <http://dx.doi.org/10.3141/2650-13>.

Wilhelms, M-P., Henkel, S., and Falk, T. 2017. To earn is not enough: A means-end analysis to uncover peer-providers' participation motives in peer-to-peer carsharing. *Technological Forecasting and Social Change*, 125, 38-47. Elsevier BV. <http://dx.doi.org/10.1016/j.techfore.2017.03.030>.

Wilhelms, M-P., Merfeld, K., and Henkel, S. 2017. Yours, mine, and ours: A user-centric analysis of opportunities and challenges in peer-to-peer asset sharing. *Business Horizons*, 60(6), 771-781. <http://dx.doi.org/10.1016/j.bushor.2017.07.004>.

Willing, C., Brandt, T., and Neumann, D. 2017. Electronic mobility market platforms - a review of the current state and applications of business analytics. *Electronic Markets*, 27(3), 267-282. <http://dx.doi.org/10.1007/s12525-017-0257-2>.

Wohlin, C. 2014. Guidelines for snowballing in systematic literature studies and a replication in software engineering. *Proceedings of the 18th International Conference on Evaluation and Assessment in Software Engineering – Ease '14*, 1-10.

Wynstra, F., Spring, M., and Schoenherr, T. 2015. Service triads: A research agenda for buyer–supplier–customer triads in business services. *Journal of Operations Management*, 35, 1-20. <http://dx.doi.org/10.1016/j.jom.2014.10.002>.

Yamada, K. 2019. The Effects of Customer Expectations for Consumer Behavior in Reputation Information Sites. In: TETI, R. & DADDONA, D. M. (eds.) *12th Cirp Conference on Intelligent Computation in Manufacturing Engineering*, 79, 684-689. Amsterdam: Elsevier Science Bv. <http://dx.doi.org/10.1016/j.procir.2019.02.036>.

Yelp. 2020. Available at: <https://www.yelp.com/>. (Accessed: 14 February 2020).

Yin, J., Qian, L., and Shen, J. 2019. From value co-creation to value co-destruction? The case of dockless bike sharing in China. *Transportation Research Part D: Transport and Environment*, 71, 169-185. <http://dx.doi.org/10.1016/j.trd.2018.12.004>.

Yin, R. K. 2001. *Estudo de caso: planejamento e métodos*. 2. ed. Porto Alegre: Bookman.

Zeithaml, V. A. 1988. Consumer Perceptions of Price, Quality, and Value: a means-end model and synthesis of evidence. *Journal Of Marketing*, 52(3), 2-22. SAGE Publications. <http://dx.doi.org/10.1177/002224298805200302>.

Zhang, T. C., Gu, H., and Jahromi, M. F. 2019. What makes the sharing economy successful? An empirical examination of competitive customer value propositions. *Computers in Human Behavior*, 95, 275-283. Elsevier BV. <http://dx.doi.org/10.1016/j.chb.2018.03.019>.

Zhang, T. C., Jahromi, M. F., and Kizildag, M. 2018. Value co-creation in a sharing economy: The end of price wars? *International Journal of Hospitality Management*, 71, 51-58. Elsevier BV. <http://dx.doi.org/10.1016/j.ijhm.2017.11.010>.

Zhou, F., Zheng, Z., Whitehead, J., Perrons, R., Page, L., and Washington, S. 2017. Projected prevalence of car-sharing in four Asian-Pacific countries in 2030: What the experts think. *Transportation Research Part C: Emerging Technologies*, 84, 158-177. Elsevier BV. <http://dx.doi.org/10.1016/j.trc.2017.08.023>.

Zoepf, S. M. and Keith, D. R. 2016. User decision-making and technology choices in the U.S. carsharing market. *Transport Policy*, 51, 150-157. Elsevier BV. <http://dx.doi.org/10.1016/j.tranpol.2016.01.010>.

Zuo, W., Zhu, W., Chen, S. and He, X. 2019. Service quality management of online car-hailing based on PCN in the sharing economy. *Electronic Commerce Research and Applications*, 34.1-11. <http://dx.doi.org/10.1016/j.elerap.2019.100827>.

APPENDICES

This section presents support and complementary materials elaborated by the researcher. They contribute to a better understanding of the stages and development of this thesis.

APPENDIX A – Research Protocol

APPENDIX B – PRISMA recommendation checklist

APPENDIX C – Tabulation and classification example of some of the articles selected for the final analysis portfolio

APPENDIX D – Questionnaire 1 (sent to carsharing services users)

APPENDIX E – Questionnaire 2 (sent to carsharing provider companies)

APPENDIX F – Questionnaire 3 (sent to Brazilian capitals city halls with carsharing services)

APPENDIX G – Example of comparison between cases for one of the analyzed registration units

APPENDIX A – Research Protocol

RESEARCH PROTOCOL**RESEARCH TITLE:****CRITICAL SUCCESS FACTORS IN SHARED MOBILITY SERVICE OPERATION:****Carsharing Service Case Study****General Objective (Research aim):**

To determine the critical success factors in the operation of a carsharing service solution-demand network.

Why study this topic (Justification/scientific evidence of the relevance and importance of the topic):

The research is justified in the theoretical field by the advance in knowledge about which factors are more critical in the operation of shared mobility services. In the practical field, the research contributes to the factors and actions that should be considered by shared mobility service companies, in line with the interests and motivations of other actors in the service network, such as their consumers, suppliers, and city halls.

Data collection method and field:

Research Method: Multiple Case Study.

Secondary data collection:

- Online data collection through netnography (Tweets from Twitter and reviews from Yelp).

Primary data collection:

- Questionnaires: sending via Twitter and Facebook, receiving responses via Google Forms.

Procedures for data collection:

Secondary data: bibliographic research (systematic literature review) and netnography.

Primary data: field survey – Questionnaires.

Identification of material sources for the research:

Systematic Literature Review, supported by the PRISMA recommendation.

Description of the characteristics of the population / sample to be studied:

- Case studies of six carsharing services.
- Collection of publications on Twitter and Yelp from users of the six carsharing services.
- Survey by questionnaires sent to 3 different groups:

1) Group 1 – users of carsharing services.

2) Group 2 – carsharing service companies.

3) Group 3 – city halls of Brazilian capitals.

Sample selection, inclusion, and exclusion criteria:

For the case studies selection:

- a) **As to the target audience:** we will select only companies in the B2C modality, not including business-to-business services (B2B) or customer-to-customer (C2C or P2P) modalities.
- b) **Regarding geographic location and coverage area:** we will not select carsharing cases from eastern countries such as China and Russia. Furthermore, the language of the country of origin is a selection criterion. Therefore, cases from North America, Latin America, and Europe will be selected.
- c) **Considering the operating period:** we will only selected companies with a history of operation for a minimum of 5 years to guarantee a greater volume of data collected.

Criteria to send the online questionnaires:

Inclusion criteria:

- **For Group 1:** Users, of all nationalities, over 18 years old, with active Twitter and Facebook accounts, who have already used carsharing services at least once.
- **For Group 2:** Companies that provide carsharing services, in the B2C modality, selected as case studies will be included;
- **For Group 3:** The survey will include city halls from Brazilian capitals that have or have already announced the implementation of carsharing services in their cities.

Exclusion criteria:

- **For Group 1:** We will exclude from the survey persons recruited who are not sufficiency in the languages in which the questionnaires will be made available. We will also exclude from the data analysis users of carsharing services from companies established in Russia, Asia, Africa, and Oceania, or people who have not used B2C carsharing services.
- **For Group 2:** We will exclude from the research analysis the companies that were not selected as case studies in the survey or were not mentioned by users in their responses.
- **For Group 3:** Will be excluded from the survey, the city halls of Brazilian capitals that have not implemented or have not yet announced the implementation of carsharing services in their cities by the year 2020.

Specific objective a) (which operationalizes the general objective):						
a) Discern the main factors involved in the operation of shared mobility services.						
Why / how is it linked to the general objective:						
To be able to determine the critical success factors in the operation of a carsharing service demand-solution network, first it is necessary to identify the main factors that intervene in the operation of shared mobility services, including carsharing.						
Constructs and variables involved in solving the objective	Background authors	Correspondent questions in the collection instrument (questionnaire)	What do we want to measure or discover with this question	Metric to be used for analysis	Justification of the metric used	List and meaning of scale / groups / levels to be used in the metric used
1.1 Use experience	Möhlmann (2015)	Netnography Question 3 – Companies (Quest.2) 3. How does the carsharing company monitor each customer's use experience?	User's perception after a service use situation (good or bad) The company's concern with monitoring the experience of its customers	Positive x negative online posts	Check the users' perception of their usage experiences, and check whether the company is concerned with monitoring its customers' experience	Online posts text
1.2 Satisfaction and dissatisfaction	Cheng, Fu, and Vreede (2018); Coxon, (2017)	Netnography Question 2 – Users (Quest.1) 2. In general, how do you rate your satisfaction with this carsharing service? Question 4 – Companies (Quest.2) 4. Does your carsharing company carry out constant surveys to monitor the general satisfaction of its customers? Could you describe how?	Percentage of satisfaction or dissatisfaction with the service	User Question. Absolute quantity Companies Question. Long text answer	Check the level of customer satisfaction and whether the company conducts surveys and knows the level of customer satisfaction	Satisfied or pleased More or less satisfied Dissatisfied
1.3 Customer retention, reuse, and loyalty	Akhmedova, Mas-Machuca, and Marimon (2020); Cheng, Fu, and Vreede (2018); Hu, (2019)	Netnography Question 3 – Users (Quest.1) 3. Would you use this same carsharing service again? Question 5 – Companies (Quest.2) 5. Which strategies does the carsharing company hold to seek customer retention?	Percentage of users' intention to reuse the service and company actions to encourage this	Users Question. Absolute quantity Companies Question. Long text answer	Check the level of intention of reuse by customers and if the company is aware and implements strategies to retain customers	Yes No I don't know

Constructs and variables involved in solving the objective	Background authors	Correspondent questions in the collection instrument (questionnaire)	What do we want to measure or discover with this question	Metric to be used for analysis	Justification of the metric used	List and meaning of scale / groups / levels to be used in the metric used
1.4 Electronic Word-of-Mouth (eWoM)	Coxon, Napper, and Richardson (2019)	Netnography Question 4 – Users (Quest.1) 4. Would you recommend this carsharing service to others? Question 6 – Companies (Quest.2) 6. Does the carsharing company follow what users post about it on social media and on review sites?	Percentage of user intent to recommend the service Check the company's response to the users' eWoM and check if the company interacts with its customers on social networks	Absolute quantity Long text answer	Check the level of customer recommendation intent and whether the company is aware of what users say about them on social networks	Yes No I don't know
2.1 Access and availability	Maioli, Carvalho, and Medeiros (2019); Mont and Plepys, (2003); Parasuraman, Zeithaml, and Berry (1988)	Netnography	User's perception of service access and availability	Positive x negative online posts	Check reports and specific situations	Online posts text
2.2 Security and privacy	Parasuraman, Zeithaml, and Malhotra (2005)	Netnography Questions 6-7 – Users (Quest.1) 6. In your perception, does this carsharing company guarantee the privacy of your data? 7. In your perception, does this carsharing company guarantee your physical well-being?	Percentage of the user's perception of service security	Absolute quantity	Check the level of security perception by users	Yes More or less No I don't know
2.3 Maintenance and cleaning	Akhmedova, Mas-Machuca, and Marimon (2020)	Netnography	User's perception of the service's maintenance and cleaning	Positive x negative online posts	Check reports and specific situations	Online posts text
2.4 Continuous improvement	Akhmedova, Mas-Machuca, and Marimon (2020)	Question 10 – Users (Quest.1) 10. In your perception, does this carsharing company promote actions to improve its service? Question 7 – Companies (Quest.2) 7. How does the company promote actions to improve its carsharing service?	Percentage of user perception of service improvements and enhancements Company responses to user suggestions	Absolute quantity Long text answer	Check the user's perception of improvements and whether the company is concerned about listening and accepting the suggestions	Yes More or less No I don't know

Constructs and variables involved in solving the objective	Background authors	Correspondent questions in the collection instrument (questionnaire)	What do we want to measure or discover with this question	Metric to be used for analysis	Justification of the metric used	List and meaning of scale / groups / levels to be used in the metric used
2.5 Communication and customer service	Mont and Plepys (2003); Parasuraman, Zeithaml, and Malhotra (2005); Cheng, Fu, and Vreede (2018),	Netnography	User's perception of communication	Positive x negative online posts	Check reports and specific situations	Online posts text
2.6 Empathy	Mont and Plepys, (2003); Parasuraman, Zeithaml, and Berry (1988)	Netnography Question 8 – Users (Quest.1) 8. Do you consider this carsharing company treats its customers with empathy and respect?	Percentage of user perception of empathy	Absolute quantity	Check the level of perception of empathy by users	Yes More or less No I don't know
2.7 Charges and prices	Arcidiacono (2018); Parasuraman, Zeithaml, and Malhotra (2005)	Question 9 – Users (Quest.1) 9. How do you rate the price charged for using this carsharing service?	User's perception of the prices charged for the service	Absolute quantity	Check the user's perception of prices	- High – excessive price not justified - Adequate – fair price for the service provided - Low – very advantageous price for the service provided - I don't know
2.8 Flexibility	Parasuraman, Zeithaml, and Malhotra (2005)	Netnography	User's perception of service flexibility	Positive x negative online posts	Check reports and specific situations	Online posts text

Constructs and variables involved in solving the objective	Background authors	Correspondent questions in the collection instrument (questionnaire)	What do we want to measure or discover with this question	Metric to be used for analysis	Justification of the metric used	List and meaning of scale / groups / levels to be used in the metric used
3.1 Offer or value proposition	Arcidiacono and Pais (2018); Osterwalder and Pigneur (2010)	<p>Question 11 – Users (Quest.1) 11. What do you seek as a value when using this carsharing service?</p> <p>Question 8 – Companies (Quest.2) 8. What is the main value proposition offered by the company in its carsharing service?</p> <p>Questions 3-4 – City halls (Quest.3) 3. From the point of view of your city hall, what are the positive attributes of providing a carsharing service to the city?</p> <p>4. What is the main value proposition of the carsharing service for your city hall and city?</p>	What each actor sees as the value of the carsharing service	Checkboxes and long text answer	Check each actor's perception of the value delivered by the carsharing service	<p>Question 11 – Users - Novelty and innovation - Performance - Vehicles brands and models - Status - Price (cost reduction) - Convenience - Other</p> <p>Question 8 – Company Long text answer</p> <p>Questions 3 – City halls Long text answer List of positive and negative attributes</p> <p>Questions 4 – City halls Absolute quantity</p>
3.2 Operating model	Terrien et al., (2016)	<p>Question 12 – Users (Quest.1) 12. Considering the available carsharing operational models, which one do you prefer?</p> <p>Question 5 – City halls (Quest.3) 5. For your city hall, what is the ideal carsharing service operating model, considering urban mobility?</p>	Percentage of the operating model preferred by each actor	Checkboxes	Check each actor's perception of the different operating models	<ul style="list-style-type: none"> - One-way free-floating - One-way station-based - Round-trip - I don't know
3.3 Partner network	Boons and Lüdeke-Freund (2013); Cherubini, Iasevoli, and Michelini, (2015); Lackzo et al. (2019)	<p>Question 9 – Companies (Quest.2) 9. Who are the main partners of your carsharing company?</p> <p>Question 6 – City halls (Quest.3) 6. In your perception, is your city hall seen as a carsharing service partner?</p>	Agreements and partnerships with government, companies, etc.	Long text answer Absolute quantity	Check the existence or not of partnerships formed between companies and public entities	<p>Question 9 – Companies Long text answer</p> <p>Question 6 – City halls Long text answer</p>

Constructs and variables involved in solving the objective	Background authors	Correspondent questions in the collection instrument (questionnaire)	What do we want to measure or discover with this question	Metric to be used for analysis	Justification of the metric used	List and meaning of scale / groups / levels to be used in the metric used
3.4 Customer segments	Osterwalder and Pigneur (2010)	Search in websites for information about carsharing companies	B2C, B2B, or P2P	Secondary data	Check the most used and accepted models	B2C, B2B, or P2P
3.5 Forms of customer relationship	Boons and Lüdeke-Freund (2013); Osterwalder and Pigneur (2010)	<p>Question 13 – Users (Quest.1) 13. How do you prefer to contact this carsharing company?</p> <p>Question 10 – Companies (Quest.2) 10. What are the main communication channels with customers of the carsharing service?</p>	What are the preferences of forms of relationship with the customer and the forms of customer service provided by the company	Checkboxes	Check which forms of relationship are available and preferred by customers / offered by the company	<ul style="list-style-type: none"> - By phone / call to a service channel - Online service via chat - Online service by email - Social networks - Personally / face-to-face service
3.6 Financial model	Boons and Lüdeke-Freund (2013); Osterwalder and Pigneur (2010)	<p>Question 14 – Users (Quest.1) 14. How do you prefer to pay for the use of this carsharing service?</p>	What are the preferences on the ways to paying for the service	Checkboxes	Check which billing methods are available and preferred by customers	<ul style="list-style-type: none"> - Charged for each use, according to the time used - Charged for each use, according to the distance traveled - Charged for each use, according to both the time and distance traveled - Charged in a monthly subscription fee - Charged in an annual subscription fee
3.7 Compliance with legislation and incentives	Cherubini, Iasevoli, and Michelini (2015); Vezzoli et al., (2015)	<p>Question 15 – Users (Quest.1) 15. In your perception, is this carsharing company concerned with following local regulations?</p> <p>Question 11 – Companies (Quest.2) 11. What partnerships and incentives have been agreed with the local government to operate the carsharing service?</p> <p>Question 7 – City halls (Quest.3) 7. Are there incentives and partnerships from your city hall to operate the carsharing service in your city? Could you describe which ones?</p>	Check if the company follows parking rules, taxes, exemptions Identify whether there are agreements with the city for the operation of the service	<p>User Question. Absolute quantity</p> <p>Companies Question. Long text answer</p> <p>City halls Question. Checkboxes</p>	Check whether there are initiatives by the company in following the legislation and in the formation of partnerships and incentives with the city hall	<p>Question 15 – Users Yes More or less No I don't know</p> <p>Question 11 – Companies Long text answer</p> <p>Question 7 – City halls Yes/No Long text answer</p>

Specific objective b) (which operationalizes the general objective):						
b) Identify the main actants and their interactions in the operation of carsharing services.						
Why / how is it linked to the general objective:						
To be able to determine the critical success factors in the operation of a carsharing service demand-solution network, it is also necessary to identify which are the main actants and how the interactions between them occur in a car sharing service operation network.						
Constructs and variables involved in solving the objective	Background authors	Correspondent questions in the collection instrument (questionnaire)	What do we want to measure or discover with this question	Metric to be used for analysis	Justification of the metric used	List and meaning of scale / groups / levels to be used in the metric used
4.1 Users	Arcidiacono and Pais (2018)	Netnography	Identify the different types of users	Mention of the type of actor	Follow the actors' and their actions to check their presence on the network	Online posts text
4.2 Carsharing companies	Somers, Dewit, and Baelus (2018)	Netnography and secondary data	Identify the structure that supports the establishment of the platform and the value proposition	Mention of the type of actor	Follow the actors' and their actions to check their presence on the network	Online posts text
4.3 Support companies, suppliers, and manufacturers	Chowdhury, (2017); Lesteven and Leurent (2016); Pulkkinen et al., (2019)	Netnography	Identify who are the actors that provide support services: maintenance, distribution of cars, Suppliers in general	Mention of the type of actor	Follow the actors' and their actions to check their presence on the network	Online posts text
4.5 Infrastructure and ecosystem (non-human actors)	Couzineau-Zegwaard and Meier (2018); Somers, Dewit, and Baelus (2018)	Netnography	Technical objects (cars, batteries, charging terminals, telecommunications infrastructure) Website, application, GPS, reservation system	Mention of the type of actor	Follow the actors' and their actions to check their presence on the network	Online posts text

Constructs and variables involved in solving the objective	Background authors	Correspondent questions in the collection instrument (questionnaire)	What do we want to measure or discover with this question	Metric to be used for analysis	Justification of the metric used	List and meaning of scale / groups / levels to be used in the metric used
4.6 Government and local authorities	Hoffman et al. (2019); Vezzoli et al., (2015)	Netnography	City Halls and Public Authorities	Mention of the type of actor	Follow the actors' and their actions to check their presence on the network	Online posts text
4.7 Citizens (society)	Ferrero et al. (2018)	Netnography	How society is involved in the carsharing network	Mention of the type of actor	Follow the actors' and their actions to check their presence on the network	Online posts text
5.1 Trust and reliability	Chowdhury (2017); Liang, Choi, and Joppe (2018); Parasuraman, Zeithaml, and Malhotra (2005)	Netnography Question 5 – Users (Quest.1) 5. In your perception, is this carsharing service reliable?	Percentage of perception of trust	Absolute quantity	Check the level of trust by users in the service	Yes More or less No I don't know
5.2 Value co-creation	Cherubini, Iasevoli, and Michelini (2015); Gonross, (2013); Hamidi (2020); Li (2019); Perboli (2018)	Question 16 – Users (Quest.1) 16. In your perception, does this carsharing company consult its customers to promote updates and improvements? Questions 12-13 – Companies (Quest.2) 12. What actions does the carsharing company hold to allow the inclusion of its users in order to promote updates and improvements? 13. What actions does the carsharing company hold to promote cooperation between partners? Question 8 – City halls (Quest.3) 8. Are there actions to promote the public-private partnership between your city hall and the carsharing company? Could you describe which ones?	Percentage of perception that users have of co-creation by the company Identify interaction actions between two or more actors in the network User participation Public-Private Partnerships	User Question. Absolute quantity Companies Question. Long text answer City halls Question. Long text answer	Check the existence or not of actions that promote co-creation between actors	Question 16 – Users Yes More or less No I don't know Question 8 – City halls Yes/No Long text answer List of actions

Constructs and variables involved in solving the objective	Background authors	Correspondent questions in the collection instrument (questionnaire)	What do we want to measure or discover with this question	Metric to be used for analysis	Justification of the metric used	List and meaning of scale / groups / levels to be used in the metric used
5.3 Value co-destruction	Sthapit and Bjork, (2019)	<p>Questions 17-18 – Users (Quest.1) 17. Have you ever encountered situations of misuse, by other customers, of a carsharing vehicle?</p> <p>18. Have you ever had a bad interaction with this carsharing company?</p> <p>Questions 14-15 – Companies (Quest.2) 14. What actions does the company take to prevent the misuse of its carsharing vehicles by its users? (Vehicle that has been left dirty, damaged, parked in an irregular location, etc.)</p> <p>15. What actions does the carsharing company take to avoid bad interactions with its customers?</p> <p>Question 9 – City halls (Quest.3) 9. Are there actions of your city hall to prevent the misuse of carsharing vehicles in the urban environment? Could you describe which ones?</p>	<p>Percentage of users' perception of value co-destruction</p> <p>Identify misuse actions by users Identifying bad interactions between customer and company</p>	<p>User Question. Absolute quantity</p> <p>Companies Question. Long text answer</p> <p>City halls Question. Long text answer</p>	<p>Check for actions that promote or prevent co-destruction between actors</p>	<p>Questions 17-18 – Users Yes No I don't know</p> <p>Question 9 – City halls Yes/No Long text answer List of actions</p>

Specific objective c) (which operationalizes the general objective):

- c) Correlate factors and actants with cases of continuity and interruption of carsharing services.

Why / how is it linked to the general objective:

To determine the critical success factors in the operation of a carsharing service solution-demand network, we will compare the factors and actants identified in the literature with the cases of continuity and interruption of carsharing services to identify how they should be considered to ensure the continuity of the network.

Procedures:

We will conduct a Deductive Content Analysis based on the conceptual-theoretical model built from the literature, on the data collected in the questionnaires, and the online comments collected by netnography.

Afterward, we will perform a cross-analysis between the different sample groups, the analysis categories, and data triangulation from various sources.

APPENDIX B – PRISMA recommendation checklist

Section/topic	#	Checklist item
TITLE		
Title	1	Systematic review: CRITICAL SUCCESS FACTORS IN SHARED MOBILITY SERVICE OPERATION: Carsharing Service Case Study
ABSTRACT		
Structured summary	2	<ul style="list-style-type: none"> • Thesis: the main critical success factors for operating a carsharing service solution-demand network are related to a set of elements that consider the user experience, the service quality, the business model, and the actors' interactions in the network. • Data sources: - Literature review (secondary data). - Comments and publications on social media and review websites (secondary data). - Survey by questionnaire (primary data). • Methods: Multiple case study - bibliographic review, data collection through netnography and questionnaires, and content analysis. • Implications: Literature identification of critical success factors and actants in shared mobility services.
INTRODUCTION		
Rationale	3	Research gap: lack of knowledge about the nature and intensity of the main factors and their interrelationships in a solution-demand network of shared mobility services. In the case of this study, more specifically for carsharing services offered by their provider companies.
Objectives and research questions	4	<ul style="list-style-type: none"> • Research guiding question: What are the main critical success factors in the operation of a carsharing service solution-demand network? • General Objectives: To determine the critical success factors in the operation of a carsharing service solution-demand network. • Specific Objectives: <ol style="list-style-type: none"> a) Discern the main factors involved in the operation of shared mobility services. b) Identify the main actants and their interactions in the operation of carsharing services. c) Correlate factors and actants with cases of continuity and interruption of carsharing services.

Section/topic	#	Checklist item
METHODS		
Protocol and registration	5	No registration (no support networks for systematic review in social sciences have yet been found)
Eligibility criteria	6	Criteria for scanning the databases and selecting articles <ul style="list-style-type: none"> • Time frame: last 5 years (2015-2020) • Languages considered: English and Portuguese • Type of publication: journal articles, book chapters, books, articles from scientific events, doctoral theses
Information sources	7	Selected scientific bases: 4 international databases: Science Direct, Scopus, Web of Science and ProQuest and 1 Brazilian Portal: Oasisbr Time frame: last 5 years. Last search carried out on: July/2020
Search	8	Example of search strategies used in at least one of the databases: Science Direct – Advanced Search. Find articles with these terms: “service design” AND “shared mobility”. Years: 2015-2020
Study selection	9	<ul style="list-style-type: none"> • Screening – Reading of the elements: Title, Keywords, and Abstract Elimination of references without alignment with the research objective. Incomplete references (References that were just indexes, news, or summaries). References related to the health area: the term “mobility” can also be used for studies regarding people with disabilities, and Service Design has many publications in the health field, enabling this overlapping of themes. Search keywords that appeared in the title or abstract but were not the focus of the article (not aligned with the research objectives). Terms used in another sense (mobility); no access to abstract information and especially to the full article
Data collection process	10	<ul style="list-style-type: none"> • Search in 5 pre-defined databases, using the 36 proposed combinations, importing, and storing data to the EndNote software
Data items	11	<ul style="list-style-type: none"> • Import of the initial 1,950 references collected into Endnote software, for storage and later selection
Risk of bias in individual studies	12	<ul style="list-style-type: none"> • Not applicable.
Summary measures	13	<ul style="list-style-type: none"> • Not applicable.
Synthesis of results	14	<ul style="list-style-type: none"> • Not applicable.
Risk of bias across studies	15	<ul style="list-style-type: none"> • The collected references present different views on the objectives of the sharing economy: profit-oriented or not, whether it should be managed by companies or just by people.
Additional analyses	16	<ul style="list-style-type: none"> • Not applicable.

Section/topic	#	Checklist item
RESULTS		
Study selection	17	<ul style="list-style-type: none"> • Eligibility Criteria – Researcher Criteria: Strong adherence (3); medium (2); weak (1); no adherence (0); <p>Strong adherence (weight 3): articles classified as having strong adherence were incorporated into the analysis portfolio because they contained the relationship of at least two or three of the central concepts (keywords).</p> <p>Medium adherence (weight 2): related to the key themes, but because they dealt with only one of the main themes, they underwent second filtering and tiebreaking criteria considering: number of citations, impact factor, and year of publication.</p> <p>Weak adherence (weight 1): Articles classified with weak adherence presented only one of the concepts, mainly related to the sharing economy, and were considered more relevant by the methodology used. Thus, they were set aside for a methodological review but were not included in the final analysis portfolio.</p> <p>No adherence (weight 0): these were eliminated because they were articles that, despite being related to the topic, did not address the focus and delimitation of this research, such as articles on Circular Economy or case studies aimed at the accommodation sector (Airbnb), or still related to mobility, but more concerned with measuring issues related to traffic and pollution. In addition, master's dissertations and undergraduate papers were also discarded.</p> <p>For articles classified as having medium adherence (2), tiebreaking criteria were applied: citations, impact factor, and year of publication InOrdinatio Formula (Pagani et al., 2015) = (Impact factor / 1,000) + (Nº. citations) + (Year of research x(10-(α-Year of publication))) Thus, references with an InOrdinatio index greater than 11 were included in the final portfolio, as they had at least one citation, even though they were recent publications.</p>
Study characteristics	18	Articles that present the relation of at least two or three of the central concepts (key words).
Risk of bias within studies	19	Not applicable.
Results of individual studies	20	Not applicable.
Synthesis of results	21	103 references selected at the end of the systematic review (dynamic corpus).
Risk of bias across studies	22	Not applicable.
Additional analysis	23	Not applicable.
DISCUSSION		
Summary of evidence	24	Not applicable.
Limitations	25	Not applicable.
Conclusions	26	References selected to build the thesis' theoretical framework and to construct a conceptual-theoretical model.
Funding	27	Research developed by the main researcher with a scholarship from CAPES-Brazil.

Source: Own Authorship (2021), adapted from Moher et al. (2015).

APPENDIX C – Tabulation and classification example of some of the articles selected for the analysis portfolio

Reference (Authors, Year, Journal)	Document type	Concepts covered and alignment with research objective	Researcher Criteria	Impact factor (SJR 2018)	Citations	Year of publication	InOrdinatio formula result
Möhlmann, M. (2015). Collaborative consumption: Determinants of satisfaction and the likelihood of using a sharing economy option again. <i>Journal of Consumer Behaviour</i> , 14(3), 193-207.	Journal Article	SERVICE DESIGN + SHARING ECONOMY: Service quality + Sharing Economy	3	0.87	587	2015	593.00087
Cheng, M. (2016). Sharing economy: A review and agenda for future research. <i>International Journal of Hospitality Management</i> , 57.	Journal Article	SHARING ECONOMY: Sharing economy Business Models	3	2	287	2016	294.002
Shaheen, S. A., Chan, N. D., & Micheaux, H. (2015). One-way carsharing's evolution and operator perspectives from the Americas. <i>Transportation</i> , 42(3).	Journal Article	SHARED MOBILITY SERVICES: Carsharing	3	1.85	105	2015	111.00185
Kumar, V., Lahiri, A., & Dogan, O. B. (2018). A strategic framework for a profitable business model in the sharing economy. <i>Industrial Marketing Management</i> , 69.	Journal Article	SHARING ECONOMY: Service Triad + Sharing Economy	3	2.38	48	2018	57.00238
Stocker, A., & Shaheen, S. P. (2017). Shared Automated Vehicles: Review of Business Models (pp. 1-2,4-28). Paris: Organisation for Economic Cooperation and Development (OECD).	Conference Paper	SHARED MOBILITY SERVICES: Autonomous or self-driving vehicles (AV)	3	0	47	2016	54
Liang, L. J., Choi, H. C., & Joppe, M. (2018). Exploring the relationship between satisfaction, trust and switching intention, repurchase intention in the context of Airbnb. <i>International Journal of Hospitality Management</i> , 69, 41-48.	Journal Article	SHARING ECONOMY: AirBnB	3	2	43	2018	52.002
Ambrosino, G., Nelson, J. D., Boero, M., & Pettinelli, I. (2016). Enabling intermodal urban transport through complementary services: From Flexible Mobility Services to the Shared Use Mobility Agency: Workshop 4. Developing inter-modal transport systems. <i>Research in Transportation Economics</i> , 59, 179-184.	Journal Article	SHARED MOBILITY SERVICES: MaaS	3	0.98	45	2016	52.00098
Wilhelms, M.-P., Henkel, S., & Falk, T. (2017). To earn is not enough: A means-end analysis to uncover peer-providers' participation motives in peer-to-peer carsharing. <i>Technological Forecasting and Social Change</i> , 125, 38-47.	Journal Article	SHARED MOBILITY SERVICES: Carsharing	3	1.42	29	2017	37.00142
Gargiulo, E., Giannantonio, R., Guercio, E., Borean, C., & Zenezini, G. (2015). Dynamic Ride Sharing Service: Are Users Ready to Adopt it? <i>Procedia Manufacturing</i> , 3, 777-784.	Journal Article	SHARED MOBILITY SERVICES: Ride sharing (ride hailing)	3	0.31	30	2015	36.00031
Perboli, G., Ferrero, F., Musso, S., & Vesco, A. (2018). Business models and tariff simulation in carsharing services. <i>Transportation Research Part A: Policy and Practice</i> , 115, 32-48.	Journal Article	SHARED MOBILITY SERVICES: Carsharing	3	2.04	17	2018	26.00204
Zhang, T. C., Gu, H., & Jahromi, M. F. (2019). What makes the sharing economy successful? An empirical examination of competitive customer value propositions. <i>Computers in Human Behavior</i> , 95.	Journal Article	SHARING ECONOMY: Sharing economy Business Models	3	1.71	15	2019	25.00171
Silalahi, S. L. B., Handayani, P. W., & Munajat, Q. (2017). Service Quality Analysis for Online Transportation Services: Case Study of GO-JEK. <i>Procedia Computer Science</i> , 124, 487-495.	Journal Article	SERVICE DESIGN + SHARING ECONOMY: Service quality + mobility	3	0.28	17	2017	25.00028
Vezzoli, C., Ceschin, F., Diehl, J. C., & Kohtala, C. (2015). New design challenges to widely implement 'Sustainable Product-Service Systems'. <i>Journal of Cleaner Production</i> , 97, 1-12.	Journal Article	SERVICE DESIGN: PSS	2	1,62	193	2015	199,00162
Spurlock, C. A., Sears, J., Wong-Parodi, G., Walker, V., Jin, L., Taylor, M., Todd, A. (2019). Describing the users: Understanding adoption of and interest in shared, electrified, and automated transportation in the San Francisco Bay Area. <i>Transportation Research Part D: Transport and Environment</i> , 71.	Journal Article	SHARED MOBILITY SERVICES: Carsharing	2	1,45	1	2019	11,00145

APPENDIX D – Questionnaire 1

Survey for data collection with users of carsharing services

SECTION 1 – Filtering questions

Are you older than 18?

- Yes
 No

Have you ever used any carsharing (or car club) service?

Carsharing or car club: model of car rental where you rent AND drive a car for short periods of time, often by the hour.

- Yes
 No

What country do you live in?

SECTION 2 – Questions regarding the carsharing service used by the respondent

1. Which carsharing service did you use?

(If you have used the service of more than one company, please check the one you used most often).

- Car2Go
 Communauto
 DriveNow
 Flinkster
 ShareNow
 Turbi
 Zazcar
 Zipcar
 Getaround
 Turo
 Other: _____

2. In general, how do you rate your satisfaction with this carsharing service?

- Pleased
 More or less satisfied
 Dissatisfied
 I don't know

3. Would you use this same carsharing service again?

- Yes
- No
- I don't know

4. Would you recommend this carsharing service to others?

- Yes
- No
- I don't know

5. In your perception, is this carsharing service reliable?

(Delivers what is promised, shows consistent performance)

- Yes
- More or less
- No
- I don't know

6. In your perception, does this carsharing company guarantee the privacy of your data?

- Yes
- More or less
- No
- I don't know

7. In your perception, does this carsharing company guarantee your physical well-being ?

- Yes
- More or less
- No
- I don't know

8. Do you consider this carsharing company treats its customers with empathy and respect?

- Yes
- More or less
- No
- I don't know

9. How do you rate the price charged for using this carsharing service?

- High – excessive price not justified
- Adequate – fair price for the service provided
- Low – very advantageous price for the service provided
- I don't know

10. In your perception, does this carsharing company promote actions to improve its service?

- Yes
- More or less
- No
- I don't know

11. What do you seek as a value when using this carsharing service?

(Check all that apply)

- Novelty and innovation
- Performance
- Vehicles brands and models
- Status
- Price (cost reduction)
- Convenience
- Other: _____

12. Considering the available carsharing operational models, which one do you prefer?

- Round-trip: you must pick up and return the vehicle at the same location
- One-way station-based: the car is picked up and returned at any exclusive station
- One-way free-floating: the car is picked up and returned anywhere in the city, within the company's operating area
- I don't know

13. How do you prefer to contact this carsharing company?

(Check all that apply)

- By phone / call to a service channel
- Online service via chat
- Online service by email
- Through social networks (Twitter, Instagram, Facebook, among others)
- Personally / face-to-face service
- Other: _____

14. How do you prefer to pay for the use of this carsharing service?

(Check all that apply)

- Charged for each use, according to the time used
- Charged for each use, according to the distance traveled
- Charged for each use, according to both the time and distance traveled
- Charged in a monthly subscription fee
- Charged in an annual subscription fee
- Other: _____

15. In your perception, is this carsharing company concerned with following local regulations?

(Parking rules, vehicle circulation rules, among others)

- Yes
- More or less
- No
- I don't know

16. In your perception, does this carsharing company consult its customers to promote updates and improvements?

- Yes
- More or less
- No
- I don't know

17. Have you ever encountered situations of misuse, by other customers, of a carsharing vehicle?

(Vehicle that has been left dirty, damaged, parked in an irregular location, etc.)

- Yes
- No
- I don't know

18. Have you ever had a bad interaction with this carsharing company?

(Whether in person, by phone, online contact, among others)

- Yes
- No
- I don't know

APPENDIX E – Questionnaire 2

Survey with carsharing companies

1. Which carsharing company do you work for?

2. What is your position within the carsharing company?

3. How does the carsharing company monitor each customer's use experience?

4. Does your carsharing company carry out constant surveys to monitor the general satisfaction of its customers? Could you describe how?

5. Which strategies does the carsharing company hold to seek customer retention?

6. Does the carsharing company follow what users post about it on social media and on review sites? (Twitter, Facebook, Instagram, Yelp, among others)

- () Yes
 () No
 () I don't know

7. How does the company promote actions to improve its carsharing service?

8. What is the main value proposition offered by the company in its carsharing service?
 (Check all that apply)

- () Novelty and innovation
 () Performance
 () Vehicles brands and models
 () Status
 () Price (cost reduction)
 () Convenience
 () Other: _____

9. Who are the main partners of your carsharing company?

(Check all that apply)

- Vehicle manufacturers
- Car rental companies
- Battery manufacturers
- Energy suppliers
- Technology developers of suppliers
- Other: _____

10. What are the main communication channels with customers of the carsharing service?

(Check all that apply)

- By phone / call to a service channel
- Online service via chat
- Online service by email
- Through social networks (Twitter, Instagram, Facebook, among others)
- Personally / face-to-face service
- Other: _____

11. What partnerships and incentives have been agreed with the local government to operate the carsharing service?

12. What actions does the carsharing company hold to allow the inclusion of its users in order to promote updates and improvements?

13. What actions does the carsharing company hold to promote cooperation between partners?

14. What actions does the company take to prevent the misuse of its carsharing vehicles by its users?

(Vehicle that has been left dirty, damaged, parked in an irregular location, etc.)

15. What actions does the carsharing company take to avoid bad interactions with its customers?

(Whether in person, by phone, online contact, among others)

APPENDIX F – Questionnaire 3

**Survey with city halls in Brazilian capitals
about carsharing services
(sent in Portuguese)**

1. From which city hall are you from (Capital-Federative unit)?

2. What is your role within the city hall?

3. From the point of view of your city hall, what are the positive attributes of providing a carsharing service to the city?

Positive attributes:

Negative attributes:

4. What is the main value proposition of the carsharing service for your city hall and city?

(Check all that apply)

- Novelty and innovation
- Performance
- Vehicles brands and models
- Status
- Price (cost reduction)
- Convenience
- Other: _____

5. For your city hall, what is the ideal carsharing service operating model, considering urban mobility?

(Check all that apply)

- Round-trip: you must pick up and return the vehicle at the same location
- One-way station-based: the car is picked up and returned at any exclusive station
- One-way free-floating: the car is picked up and returned anywhere in the city, within the company's operating area
- I don't know

6. In your perception, is your city hall seen as a carsharing service partner?

- Yes
- No
- I don't know

7. Are there incentives and partnerships from your city hall to operate the carsharing service in your city? Could you describe which ones?

8. Are there actions to promote the public-private partnership between your city hall and the carsharing company? Could you describe which ones?

9. Are there actions of your city hall to prevent the misuse of carsharing vehicles in the urban environment? Could you describe which ones?

(Vehicle that has been left dirty, damaged, parked in an irregular location, etc.)

APPENDIX G – Example of comparison between cases for one of the analyzed registration units

Categories and units	Case A (Closed 2008-2019)	Case B (In operation 1994-present)	Case C (Closed 2011-2019)	Case D (In operation 2001-present)	Case E (Closed 2009-2019)	Case F (In operation 2000-present)
5 Interaction between actants in the network						
<p>5.2 Value co-destruction</p> <p>USERS</p> <p>17. Have you ever encountered situations of misuse, by other customers, of a carsharing vehicle?</p> <p>18. Have you ever had a bad interaction with this carsharing company?</p>	<p>Reports of problems with vehicles parked incorrectly, dirty, out of gas, with cigarette smell, and trash</p> <p>60% of the respondents have had situations of misuse by other users</p> <p>88% of the respondents had a bad interaction with the company</p>	<p>July 2014: Wave of battery thefts from electric cars. Cleaning complaints Problems with shared use: food scraps, cigarette smell, animal hair, user who does not return the vehicle on time.</p> <p>100% of the respondents have had situations of misuse by other users</p> <p>90% of the respondents had no bad interaction with the company</p>	<p>Reports of people seeing vehicles parked in incorrect locations, such as pedestrian crossings and sidewalks Value co-destruction by users: car left dirty and parked in incorrect places Users leave company cars parked at recharging locations without recharging. This takes away the vacancy of other people with electric vehicles that need to recharge.</p> <p>56% of the respondents have had situations of misuse by other users</p> <p>100% of the respondents had no bad interaction with the company</p>	<p>Users should report signs of misuse, damage, and dirt over the phone before starting the rental. If the person who used it before does not charge the vehicle, the following user may not use it and be harmed by it. Users who notice damage and report it are then accused of having caused that damage.</p> <p>100% of the respondents have had no situations of misuse by other users</p> <p>100% of the respondents had no bad interaction with the company</p>	<p>44% of the respondents have had situations of misuse by other users</p> <p>44% of the respondents have had no situations of misuse by other users</p> <p>88% of the respondents had a bad interaction with the company</p>	<p>Many complaints about problems with shared use: people who leave the car without gas, smell of cigarettes, use it as if it were their own car, without worrying about the following user who will use it, and they do not return the vehicle on time to those who will use it later.</p> <p>50% of the respondents have had situations of misuse by other users</p> <p>62% of the respondents had a bad interaction with the company</p>
<p>COMPANIES</p> <p>14. What actions does the company take to prevent the misuse of its carsharing vehicles by its users?</p> <p>15. What actions does the carsharing company take to avoid bad interactions with its customers?</p>	<p>The mobile app had a function to assess the vehicle's condition before rental, considering cleanliness and damage</p> <p>Later, this function was removed from the app</p>		<p>Company with the most complaints about incorrect parking</p> <p>The company doesn't seem to realize this, but on the other hand, users are not "punished" with fines or extra fees, so they keep doing it. According to the comments, there were a few situations of cars parked incorrectly (few users who did this), but this was the company with the most complaints in this regard</p>	<p>2018: Users being charged for incorrect parking – for being the last users. Is it considered up to a time limit? If another user does not cancel the reservation, are they responsible for what they used before?</p>	<p>Problems on the part of the company - unable to solve users' problems</p>	<p>Company with more complaints about problems with shared use</p>
<p>CITY HALLS</p> <p>9. Are there actions of your city hall to prevent the misuse of carsharing vehicles in the urban environment? Could you describe which ones?</p>	<p>Overview not related to the case studies: There are no actions to prevent carsharing misuse by the city halls themselves since they consider the companies are the ones who should be accounted responsible. The company monitors the vehicles in real-time, for example, with battery, position, and speed control.</p>					

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