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Title: The customer journey in a Product-Service System business model

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Monograph presented to the Mechatronic Engineering course of the São Carlos School of Engineering of the University of São Paulo, as part of the requirements for obtaining the Mechatronics Engineer title.

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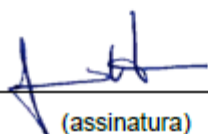
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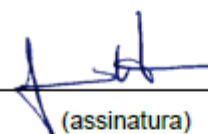
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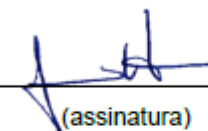
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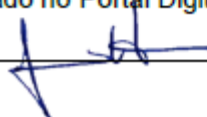
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ABSTRACT

Shiratori, E. **The customer journey in a product-service system business model**. 2020. 70 f. Monograph – São Carlos School of Engineering, University of São Paulo, São Carlos, 2020.

The customer journey map is a user-centered design tool that combines visual resources, and it takes the customer's point of view into account. A promising business model with the relevant presence of customers' perspective, the product-service system has been widely studied since its first introduction in literature in 1999. However, only a few studies have approached the two research areas and none of them has associated the characteristics of the customer journey's visual tool and the PSS business model. For this reason, this study proposes to explore how the customer journey map can support PSS design, comparing a customer journey map from what the company imagines it occurs and what the customers have described. To achieve that, a case study has been developed with interviews of the PSS company and three different customers to avoid bias. After the collected data, it has been drawn two customer journey maps, one representing the company's view and the other, the compilation of the customers' reports. For the analyses, it has been evaluated the relevant differences between the journey maps, discussed the customers feeling and emotions, and highlighted the impacts of the pandemic from Covid-19 in the customer journey. Finally, some recommendations were suggested for the company, such as actions to improve influential touchpoints, maintain critical services, and prevent changes that negatively affect user experience.

Keywords: Customer journey map. Product-service system. PSS. Case study.

RESUMO

Shiratori, E. **Jornada do usuário em um modelo de negócio sistema produto-serviço**. 2020. 70 f. Monografia – Escola de Engenharia de São Carlos, Universidade de São Paulo, São Carlos, 2020.

O mapa da jornada do usuário é uma ferramenta de design voltada ao usuário, que combina os recursos visuais com o ponto de vista do cliente. O sistema produto-serviço (PSS), um promissor modelo de negócio com relevante presença da perspectiva do usuário, já foi amplamente estudado desde sua introdução na literatura em 1999. Entretanto, poucos estudos foram realizados abordando simultaneamente os dois temas e nenhum associou as características visuais da jornada do usuário com as particularidades do modelo de negócio PSS. Por esta razão, esse estudo se propôs a explorar como o mapa de jornada do usuário consegue apoiar um PSS, comparando o que a empresa imagina que seja a jornada do usuário e o que realmente ocorre, descrito pelos próprios clientes. Para lograr este objetivo, um estudo de caso foi desenvolvido, sendo entrevistados uma empresa PSS e três diferentes clientes para evitar enviesamentos. Depois de coletar os dados, dois mapas de jornada do usuário foram desenvolvidos, um representando o ponto de vista da empresa, e o outro compilando as informações dos clientes. Para a análise, foram examinadas as principais diferenças entre os dois mapas, abordado as emoções dos usuários e destacado os impactos relativos à pandemia do Covid-19 na jornada do usuário. Por fim, algumas recomendações foram feitas para a empresa, incluindo o aperfeiçoamento de *touchpoints* relevantes, a permanência de serviços críticos e pontos a serem evitados para prevenir impactos negativos na experiência do usuário.

Palavras-chave: Mapa de jornada do usuário. Sistema produto-serviço. PSS. Estudo de caso.

LIST OF FIGURES

Figure 1 - Examples of journey maps.....	33
Figure 2 - Research steps	34
Figure 3 - Planned Customer Journey Map (1/2)	44
Figure 4 - Planned Customer Journey Map (2/2)	45
Figure 5 - Actual Customer Journey Map (1/2).....	48
Figure 6 - Actual Customer Journey Map (2/2).....	49

LIST OF TABLES

Table 1 - Definitions of Customer Journey Map	27
Table 2 - Clients' basic information.....	37

CONTENTS

1	INTRODUCTION	17
1.1	Research objective	19
1.2	Document structure	20
2	LITERATURE REVIEW	21
2.1	PSS – ProductSystem	21
2.1.1	<i>Concept</i>	21
2.1.2	<i>Types of PSS</i>	22
2.1.3	<i>Influence of different stakeholders on PSS offer</i>	23
2.2	User-Centered Design	25
2.3	Customer Journey Map	26
2.3.1	<i>Concept</i>	26
2.3.2	<i>Reasons to adopt a customer journey map</i>	28
2.3.3	<i>Customer Journey Map Structure</i>	29
2.3.4	<i>Customer Journey Planning and Analysis</i>	31
3	METHODOLOGY	34
3.1	Phase I – Studies and Preparation	35
3.2	Phase II – Customer journey maps (Planning and Drawing)	36
3.3	Phase III – Data Analyses	38
4	RESULTS	40
4.1	Londrigás Business Model	40
4.2	Customer Journey Map – Planned	42
4.3	Customer Journey Map – Actual	46
4.4	Customer Journey Map Analysis	50
4.4.1	<i>Planned x Actual Customer Journey Map</i>	50
4.4.2	<i>Pandemic impacts</i>	51
4.4.3	<i>Customer Experience Improvements</i>	52
5	CONCLUSION	55
	BIBLIOGRAPHY	57

APPENDIX A	64
APPENDIX B	69

1 INTRODUCTION

The product-service systems (PSSs) are business models that currently bring different solutions for the market, and a large number of authors focus their studies on it (FARGNOLI; HABER; SAKAO, 2019). It differs mainly from other business models in at least three points: first, the potential to reduce waste and extend the product's life span, enhancing the efficient use of a product (MONT, 2001; TUKKER, 2004); second, the additional value for products, strengthen the company's contact with users, and for services, building up a safeguard with a tangible product (MONT, 2001); and third, the increase in the diversity of options for the customers (MONT, 2001). As the name suggests, it combines both product and service, focusing more on one or another, depending on each case (MORELLI, 2003).

Since 1999 PSS has been described by many authors, such as Goedkoop et al. (1999), Mont (2001), Manzini & Vezzoli (2003) and Wong, (2004). Goedkoop et al. (1999, p. 18) define¹:

A product service-system (PS system) is a marketable set of products and services capable of jointly fulfilling a user's need. The PS system is provided by either a single company or by an alliance of companies. It can enclose products (or just one) plus additional services. It can enclose a service plus an additional product. And product and service can be equally important for function fulfillment. The researcher's need and aim to determine the level of the hierarchy, system boundaries, and the system element's relations (GOEDKOOOP et al., 1999, p.18).

PSS comes as a solution to work around the business challenges, offering opportunities for competitive advantages (KJAER et al., 2019) and, most of the time, reduce the impacts on the environment (TUKKER, 2004). Economically viable and

¹ For this study, it has been used the concept of PSS by Goedkoop et al., dated from 1999, which was the first one to establish the concept and is the most cited one (BAINES et al., 2007).

sustainable, PSS tends to be a promising business (FARGNOLI et al., 2018; MATSCHEWSKY; KAMBANOU; SAKAO, 2018).

The evolution from product or service to PSS might drive a developed PSS that exceeds users' needs (FARGNOLI; HABER; SAKAO, 2019). Therefore, a resource capable of guiding the process in a customer-oriented way is essential. Some of the advantages of this customers' perspective are the opportunity of discoveries (WILSON; CORLETT, 2005; OSTERWALD; PIGNEUR, 2011); the intensified experience of the user (WILSON; CORLETT, 2005); and the increased efficiency of the design process (MONT, 2001; WILSON; CORLETT, 2005). With the users' perspective, the business model's internal process is expanded to new ideas and, at the same time, becomes more efficient, saving money and time.

PSS's complexity, bringing both the challenges from an excellent product and service development, requires a systematic tool capable of breaking down the multiple steps of a customer journey to understand each step better (SONG; SAKAO, 2017). A customer journey can separate visually or graphically (SPERANO et al., 2019) those steps. The steps in a customer journey are touchpoints (HALVORSRUD; KVALE; FØLSTAD, 2016). Zomerdijk and Voss (2010) describe touchpoints as the contact between customers and an organization through different channels over time, such as an advertisement (LEMON; VERHOEF, 2016). These touchpoints are sorted in the customer journey by time (ROSENBAUM; OTALORA; RAMÍREZ, 2017; VOORHEES et al., 2017) and by types (LEMON; VERHOEF, 2016). As a result, the company can map when, where, and how are the interactions between them and the customer plus identify possible underestimated/overestimated touchpoints by the business.

Some impacts on the way companies perceive their relationship with the customer were already studied and have been published as case studies, like the ones from Rosebaum, Otalora, and Ramirez (2017) or Halvorsrud, Kvale, and Folstad (2016) for example. In the research developed by Rosebaum, Otalora, and Ramirez (2017), the studied company had realized how important some touchpoints were compared to others and started to plan the improvement of their service strategically, focusing on customer journey analysis results. Halvorsrud, Kvale and Folstad (2016) reported their company's case study uncovered up to 100% more touchpoints from

customers than the planned journey by the company, indicating the potential of customer journey analysis (CJA) to reveal new information.

At a first glance, the development of a product-service system in engineering assumes that the product is developed and will have a service associated with it. The product's lifetime starts with the development, followed by its production, and go in line. However, even after a product-service system is designed, there still have possibilities to be improved. The customer journey map comes along with that and can either help to develop a product-service system (PSS Design) or to improve an already existing one (PSS Improvement). In this research, the PSS case study has already been designed and it is currently in the phase of improvement.

Even though customers' journey and PSS has been widely studied, there is not too much theoretical content in the literature about the application of customers' journey in a PSS, nor case studies about it. A research in database Scopus on September 1st, 2020 with keywords' combination "product-service system" and "customer journey" revealed six results; "product-service system" and "user journey", two results; and "product-service system" and "journey map", one result. Similar research in WoS (Web of Science) exhibited zero, one, and zero results, respectively. Some researches addresses "PSS" and "customer journey"; however, they either do not focus on the business model (DEWIT et al., 2016), approach customer journey theory superficially (SHI et al., 2018), only general aspects (KÖLSCH et al., 2017) or explain about customer journey without any visual or graphic illustration (OLIVOTTI et al., 2018). Consequently, it is relevant to study this subject more in-depth and link the literature from PSS and customers' journey map.

1.1 Research objective

The purpose of this study is to analyze how the customer journey can support PSS and contribute both for PSSs and customer journey literature with a practical study. To achieve that, with a case study of a gas distributor company, the company's planned customer journey is compared with the actual customer journey reported by the users in a PSS business model and it is evaluated if the results are consistent with what the literature has developed so far. Together with that, it studies where in between

the process, the touchpoint can either be upgraded and invested more time or reduce efforts due to its lower impact in customer experience. Finally, the suggestions from the customers is analyzed and the impacts of the pandemic of Covid-19 is exposed.

1.2 Document structure

This research is divided into seven chapters. The first chapter introduces the subjects, shows the reasons for the theme to be studied, includes the objective of the monograph, the document structure.

The second chapter is the literature review, presenting three main sections: first, the concepts of the product-service system, its types, and stakeholders; then, an introduction to user-centered design; and, at the end of the chapter, the concepts of the customer journey map, reasons to adopt it, its structures, planning, and analyses.

The third chapter presents the methodology, with the step-by-step of the study and the fourth chapter shows the results achieved.

The fifth and last chapter concludes the study, including final remarks, limitations of the research, and recommendations for future studies. After all, the appendices related to interview protocols and the bibliography are presented in the document's final part.

2 LITERATURE REVIEW

This research has focused on two main concepts: PSS and customer journey. In this section (Literature Review), first, it has been presented different PSS concepts proposed in the literature, its multiple types as a business model, and various stakeholders being affected or influencing it. Second, the customer journey is a user-centered design (UCD) method; therefore, UCD has been approached initially. Later, it has been introduced the concept of the customer journey's possible structures. Finally, it has been pointed out a few main points to consider to plan and to analyse a customer journey map.

2.1 PSS – Product-Service System

2.1.1 *Concept*

The concept of PSS was first stated in 1999 by Goedkoop et al., describing PSS's main elements like products, services, and players' networks. He also highlights competitiveness' stand out and solution for customers' needs as goals to be achieved. Mont (2001) had described similarly, addressing those main components likewise.

For Manzini and Vezolli (2002), PSS has a more strategic meaning and still satisfies customers' needs. Additionally, they mention only the process of servitization instead of both servitization and productization – the two procedures to achieve PSS, according to Baines et al. (2007). It is important to clarify that servitization is the movement from a product's business extending their scope with service (VANDERMERWE; RADA, 1988), while productization is the process of including a product into a service business (BAINES et al., 2007).

In the Beuren, Gomes Ferreira, and Cauchick Miguel (2013) research, PSS's many definitions can be divided in two. The first one analyses PSS only as a business model to fulfill customer's needs. Furthermore, the second part also associates PSS with sustainability and social concerns (MANZINI; VEZOLLI, 2002). The association is sometimes described as a goal, as stated by Goedkoop et al. (1999), Mont (2001), Brandstötter et al. (2003), others link sustainability as an outcome (BAINES et al., 2007). As per Baines et al. (2007), many concepts reported in the literature

(GOEDKOOP et al., 1999; MONT, 2001; BRANDSTÖTTER et al., 2003; MANZINI; VEZZOLI, 2003; WONG, 2004) includes a product and service together fulfilling customers' requests.

As mentioned before, this study uses the widely accepted definition by Goedkoop et al. (1999). This concept brings both the relation of product and service and business strategy as a PSS driver. The customer-oriented approach is crucial, particularly in a moment with "*rapid technology cycles, frequently changing consumer preferences and increasing market competition*" (KHAN et al., 2018, p. 1154). After the delimitation of the PSS scope, the next subchapter goes deeper into the many types of PSS. PSS has a broad scope, and classifications were divided to better understand the many variations inside this business model.

2.1.2 Types of PSS

Even though PSS is one of the many business models, it is still too broad. Given that, Tukker (2004) classified PSS in three main categories (product-oriented services, use-oriented service, result-oriented service), which is the distinction most authors' classifications adopt (TUKKER, 2015). Authors, as Neely (2008), Adrodegari et al. (2015) divided into even more categories, but they has not been studied in this research.

The first category is product-oriented services. PSS that fits in this category sells a tangible product, as the traditional way, and adds a service, consultancy, or advice (TUKKER, 2004; NEELY, 2008; DE CASTRO RODRIGUES; NAPPI; ROZENFELD, 2014; KJAER et al., 2019). In this case, the service is designed to mitigate the work from the customers or the number of suppliers (REIM; PARIDA; ÖRTQVIST, 2015). According to Yang et al. (2018), this type of PSS is the most common. To illustrate, a product-oriented PSS can be a company selling air separation that provides service support for the customer, such as installation, maintenance (YANG et al., 2018).

The second category is use oriented services. It differs from the first one because the ownership still belongs to the provider, which increases their responsibilities and risks compared with the category before (REIM; PARIDA;

ÖRTQVIST, 2015). Subtypes here are distinct from each other by the time of access the user has, being unlimited, limited, and individual or limited and shared (TUKKER, 2004; DE CASTRO RODRIGUES; NAPPI; ROZENFELD, 2014). Additionally, it focuses on selling the functions of the product (NEELY, 2008). An example is bike-sharing, where the customer pays just for the time they are using (SOUSA-ZOMER; CAUCHICK-MIGUEL, 2019). It also includes in this category: leasing, renting, sharing, and pooling (KJAER et al., 2019; YANG; EVANS, 2019).

The third category is result-oriented. The ownership still stays with the provider, but, instead of selling a period of use, it sells a particular result or output negotiated and related to the product (TUKKER, 2004; DE CASTRO RODRIGUES; NAPPI; ROZENFELD, 2014; REIM; PARIDA; ÖRTQVIST, 2015). Result-oriented differs from a pure service because the second does not involve any kind of product at all while the first should have a product related to it (REIM; PARIDA; ÖRTQVIST, 2015). In this category are usually energy generators, like a company that sells energy instead of turbo power (from wind power) or rather than steam turbines (YANG; EVANS, 2019). For Fernandes, Martins, and Rozenfeld (2019), this last category is the most complex in terms of offering and value thus, it requires multiple know-how and a crucial stakeholder network.

2.1.3 Influence of different stakeholders on PSS offer

There are many stakeholders around a PSS business model (FERNANDES; MARTINS; ROZENFELD, 2019). Mont (2001) listed a few advantages of PSS implementation for different stakeholders: the company, the society, the government, and the customers. This chapter has approached even further and investigated the importance of those stakeholders.

A PSS provider combines advantages from a pure product and a pure service company. From product aspects, it carries a better perception, security for the customers with a tangible product, and hamper business replications, consequently protecting the company's market share (MONT, 2001; GOEDKOOOP, 2016; ELIA; GNONI; TORNESE, 2019). On the other hand, service characteristics increase product's value with different financial schemes (e.g., subscription models), recurrent

upgrades, an extension of functionalities, extension of product's lifespan, a sustainable end of the life cycle, save costs and increase the number of touchpoints. (MONT, 2001; TUKKER, 2015; GOEDKOOPT, 2016). The downside is that PSS combinations of products and services result in a more complex business model.

Society plays an essential role in the process, as well. The transformation to PSS extends companies' activities and, at the same time, increases complexity when compared to a mass-production business base (MONT, 2001). This change in business model affects the society in different ways (e.g., modifications in employment structure (MONT, 2001) and environmental impacts (GOEDKOOPT, 2016)). The society also impacts a PSS because it depends on its socio-cultural aspects to determine whether it has a specific PSS acceptance or not (REXFELT; HIORT AF ORNÄS, 2009).

An article by Hannon, Foxon, and Gale (2015), with reference from Margolis (2002), suggests the government can influence how PSS develops inside a society with public policies, like direct purchases, with regulation, and economic incentives (WHITE; STOUGHTON; FENG, 1999; HANNON; FOXON; GALE, 2015). To illustrate, a government can reduce companies' taxes for those who extract less raw materials, creates reverse logistics by recycling, remanufacturing, and reusing or tax policies in favor of retention of durable goods (WHITE; STOUGHTON; FENG, 1999).

Customers/users are the fourth stakeholders included in this study. Rexfelt and Hiort Af Ornäs (2009) differentiate both by a user as the one who interacts with the solution and customer is related to the financial transaction. In many situations, the customer and the user are the same players. Some of the advantages for them are, for example, the diversity of choices with an increase in customization and higher quality (BAINES et al., 2007; MENGONI; PERUZZINI, 2016). The variety of products and services facilitates the user to find a solution that best fits her/his needs (MONT, 2001; MENGONI; PERUZZINI, 2016), the combined relation product-service can respond faster to changes in customers' needs and conditions, and the ownership responsibilities is also part of customers' choice (MONT, 2001). PSS has environmental importance to the user too because it helps them to reduce demand for energy and materials (THOMPSON et al., 2010; KJAER et al., 2019). Rexfelt and Hiort

Af Ornäs (2009) had summarized several factors from previous studies that relate PSS with consumers' acceptance, for instance, financial reasons and relative benefits.

If PSS has advantages from one side, on the other, challenges appear implementing it and passing on those benefits to the user. For example, a save in material and energy for longer-life products, but an increase in initial price might not have a clear advantage for the customer (THOMPSON et al., 2010). Another challenge is the acceptance of customers related to the number of changes a PSS might have, including the ownership and payment methods (REXFELT; HIORT AF ORNÄS, 2009). Due to the user's particular importance during the development and improvement of a PSS, as pointed out, it is crucial to study how the users influence a business model.

2.2 User-Centered Design

User experience (UX) or customer experience does not have a universal definition yet, mostly because it has a broad range, from individual to multiple interactions, and has various focus from many different theoretical models (LAW et al., 2009). For this study, it has been used the definition from Schwager and Meyer (2007, p.3), who explained customer experience as "the internal and subjective response customers have to any direct or indirect contact with a company" (SCHWAGER; MEYER, 2007, p.3). This definition includes all multiple touchpoints with the company, and all responses felt by the customers.

The customer experience design focuses on creating a quality experience for customers by understanding them and validating hypotheses (TUSSYADIAH, 2014). As stated by Campese (2019), multiple terms appear to refer to user-centered design, including customer experience design and human-centered design, which believes that indicates the same. It has been used here both user-centered design and customer-centered design (when customers and users of a PSS are the same person).

According to Abras, Maloney-Krichmar, and Preece (2004), user-centered design helps understand psychological, organizational, and social factors. The main point is to develop and apply methods to enhance customers' experience; otherwise, a product, service, or PSS might be overdesigned (FARGNOLI; HABER; SAKAO,

2019) or under-designed. The problem of overdesign is a complex project with a waste of time and money, frequently without even delivering a product, and the problem of under design is the lack of enough value contribution for the project (COMAN; RONEN, 2010). One example is a hidden pinball application in Microsoft Word 97, which contributes nothing to Microsoft's value, it was a waste of developer effort, and have increased memory resource demand (COMAN; RONEN, 2010).

Ponsignon, Durrieu, and Bouzdine-Chameeva (2017) have reported four experience design areas: individual touchpoints, customer journey, the physical environment, and social environment. As mentioned earlier, the purpose of this study is to approach the customer journey, which has also included an exploration of touchpoints in general.

2.3 Customer Journey Map

2.3.1 Concept

The literature has already described a couple of user-centered design methods, such as service blueprint (SHOSTACK, 1984), personas, and empathy map (FERREIRA et al., 2015). Although these methods, either give an overview of all touchpoints or consider the customer's perspective, they do not have both simultaneously as the customer journey map does. The most similar method to a customer journey map is service blueprint, but it differs mainly from the focus on the customer's point of view (ZOMERDIJK; VOSS, 2010).

Sperano et al. (2019) suggest that the customer journey map originates from the service blueprint. Other authors claim it does not have an exact start point, due to its initial studies in multiple fields (e.g., design, service management, and marketing) and in parallel (FØLSTAD; KVALE, 2018). In conclusion, it does not exist a consensus about the history of the customer journey map.

Despite the uncertainty with customer journey map origin, a couple of authors have described the customer journey map so far (RICHARDSON, 2010; ZOMERDIJK; VOSS, 2010; GROCKI, 2014; HALVORSRUD; KVALE; FØLSTAD, 2016). Diana, Pacenti, and Tassi (2009) describe the customer journey map as a schematic flow

description of the experience, emphasizing touchpoints and structured with their representation. According to Stickdorn et al. (2018), the customer journey map visualizes the customer's overall experience. Some authors that have explicitly written a concept are cited in Table 1.

Table 1 - Definitions of Customer Journey Map

Definition	Authors/Source
(RICHARDSON, 2010, p.1)	"A customer journey map is a very simple idea: a diagram that illustrates the steps your customer(s) go through in engaging with your company, whether it be a product, an online experience, retail experience, or a service, or any combination."
(ZOMERDIJK; VOSS, 2010, p.74)	"Customer journey involves all activities and events related to the delivery of a service from the customer's perspective"
(GROCKI, 2014, p.1)	"Customer journey maps are a visual interpretation from an individual's perspective of their relationship with an organization, service, product or brand"
(HALVORSRUD; KVALE; FØLSTAD, 2016, p.843)	"Customer journeys (or alternately, customer journey maps) are visual representations of events or touchpoints depicted chronologically, often accompanied by emotional indicators"
(ROSENBAUM; OTALORA; RAMÍREZ, 2017, p. 144)	"[...] is a visual depiction of the sequence of events through which customers may interact with a service organization during an entire purchase process"
(DOVE; REINACH; KWAN, 2016, p. 881)	"A traditional customer journey map is a diagram that is used to visualize a customer's interactions, or touch points, with a brand."

From the definitions above, the customer journey map is summarized as a visual comprehension of touchpoints. Some authors (ZOMERDIJK; VOSS, 2010; GROCKI, 2014) go further and introduce that the customer journey map has a customer's perspective; others include emotion indicators (HALVORSRUD; KVALE; FØLSTAD, 2016).

2.3.2 Reasons to adopt a customer journey map

The customer journey map results from a combination of two main groups. The first group is the user-centered design, and it has been described in the previous chapter. Most of the advantages related to the adoption of a user-centered design method are common to customer journey maps, for example, the identification of pain points reported by Sperano et al. (2019). The second group can be categorized as graphical ways of displaying information or visualization techniques.

The most used visualization tool among service designers is probably the customer journey (SEGELSTRÖM, 2013). A visualization technique turns time more tangible to analyze (SPERANO et al., 2019), helps identify more insights, and emphasizes the important ones (SEGELSTRÖM, 2013). As reported in a data analysis research by Cui (2019), a visual tool has the power to fulfill the gap between the potential of data collection and the potential of the analyses itself. Stickdorn et al. (2018, p.44) have reported this benefit in customer journey literature in “journey maps [...] reveal all key steps of an experience”, “[...] help us to find gaps in customer experiences and explore potential solutions” (STICKDORN et al., 2018, p.44). Similarly, Kaplan (2016) has stated the customer journey map uncovers gaps in the customer experience and is expected to further optimize the experience later.

Another advantage of the customer journey as a visualization tool is the possibility to understand a multichannel environment (HALVORSRUD; KVALE; FØLSTAD, 2016), the multiple paths and multiple possibilities a customer can take (LEMON; VERHOEF, 2016). As the number of touchpoints grows, the complexity of the map increases, becoming even more necessary to use this visualization tool (RICHARDSON, 2010).

In summary, the purpose of a customer journey map is to identify the touchpoints and work on them to improve the relationship between a company and its users. The reason why the information about touchpoints and its sequence can be extracted easier is mostly due to the visual and segmented structure of a customer journey map.

2.3.3 Customer Journey Map Structure

The customer journey map is adaptative, dynamic, and flexible, able to add more dimensions or change the format of the map (SEGELSTRÖM, 2013; SPERANO et al., 2019), giving space for authors to develop multiple frameworks with various classifications of touchpoints (RICHARDSON, 2010). Possible classifications already applied in the literature are reported below.

By definition, the customer journey map is distributed through time. However, there are still divergences on the way time is classified. Richardson (2010) has classified time in “awareness”, “research”, “purchase”, and “out-of-the-box experience”, related to time after purchase. Rosenbaum, Otolara, and Ramírez (2017) have divided the timeline into “pre-service”, “service”, and “post-service”, which is similar to the way Lemon and Verhoef (2016) divided “pre-purchase”, “purchase” and “post-purchase”, and Voorhees et al. (2017), “pre-core”, “core” and “post-core”. Although it has a well-defined partition of time, the journey might not precisely be followed by the customer, it can also be non-linear, like her/him skipping one of the touchpoints proposed (RICHARDSON, 2010).

Voorhees et al. (2017) separate each time-category in a more detailed way: communication, information search, initial contact, onboarding activities, core interactions, environment, service recovery efforts, customer feedback, reviews, crowdsourcing for new service development, and recommendation.

Lemon and Verhoef (2016) classify touchpoints, besides time, by four types: a brand owned, partner-owned, customer-owned, and social/external owned. Brand owned are touchpoints managed by the firm (e.g., website, advertising, loyalty programs). Partner owned is like brand owned but includes at least one other partner

(e.g., an outsourced telemarketing company or live sale). On the other hand, customer-owned are touchpoints exclusively developed by the customer (e.g., customer's thought about the company). Finally, there are social/external owned touchpoints, including touchpoints not listed before, externally to the direct relation customer-company (e.g., other customers' opinions or independent information) (LEMON; VERHOEF, 2016).

Another way to divide touchpoints is proposed by Rosenbaum, Otalora, and Ramírez (2017). The focus was to separate in strategic responsible for an action. In their case study, an example of the division was by employees responsible for customer support, marketing, and human resources (ROSENBAUM; OTALORA; RAMÍREZ, 2017). With this categorization, the same managerial practices are brought together, although it differs from case to case.

Richardson (2010) includes even more qualitative elements. For him, it is useful to go deeper inside which actions the customer is doing in each timeframe, what is motivating them to do so or go to the next touchpoint, what scares them not to move forward, and which barriers are they facing. Along with these questions, it has been able to classify touchpoints and connect them from a qualitative perspective rather than just by time.

In summary, key elements were authors' concerns, like customers' feelings (RICHARDSON, 2010), contributors, and responsible for the actions (ROSENBAUM; OTALORA; RAMÍREZ, 2017), "touchpoint makers" (LEMON; VERHOEF, 2016), and touchpoints' moment in time.

The decision to include one categorization or another is associated with the company's preference. Suppose a company is searching for an overview map and which channels are most effective in increasing customer experience. In that case, it is probably better to include Lemon and Verhoef's (2016) four types and map the main stakeholders behind the touchpoint. From another perspective, if the company wants to improve already known key touchpoints, Richardson's (2010) approach with feelings and emotions can give more sense on where and what to improve, either by removing journey barriers or enhancing each specific touchpoint. When planning and analysing

the customer journey map with a team, with a must call for action, Rosebaum, Otalora, and Ramírez (2017) division makes it easier to delegate tasks after the analysis. Different categories depend on how the customer journey map is being planned, for which reason, and the main objective.

2.3.4 Customer Journey Planning and Analysis

Sketching a customer journey map is only one of the steps of the customer journey process, and to use it, it is necessary to start a few steps back (KAPLAN, 2016). The first authors to specifically write about and use the term “customer journey analysis” were Halvorsrud, Kvale, and Følstad (2016), although other authors have made use of customer journey maps for analysis (VOORHEES et al., 2017; SPERANO et al., 2019). The discussion can be divided into three parts: the first, preparation, and planning to draw the customer journey map; the second, draw the customer journey map; and the third, customer journey analysis from the results obtained on the map.

The preparation starts with problems’ and goals’ definition, which were the first factors among authors who had cited (GROCKI, 2014; HALVORSRUD; KVALE; FØLSTAD, 2016; KAPLAN, 2016; SPERANO et al., 2019). It is necessary to know for what purpose (GROCKI, 2014), and for who it is designing a customer journey map, taking into account might have multiple customer segments for the same company (HALVORSRUD; KVALE; FØLSTAD, 2016; KAPLAN, 2016).

Then, it should be considered to outline the time next. During this phase, the delimitation of time defines the exact moment it begins and ends the first, second, or third group of time in a specific customer journey. By way of illustration, Rosenbaum, Otalora, and Ramírez (2017) divided a mall case study in pre-service, service, and post- service. The service period was described as between the instant the client enters the mall until the moment he or she leaves. For Voorhees et al. (2017), the classification of a core service period is when the primary service is offered. Again, a customer journey map is adaptive, and it varies from case to case.

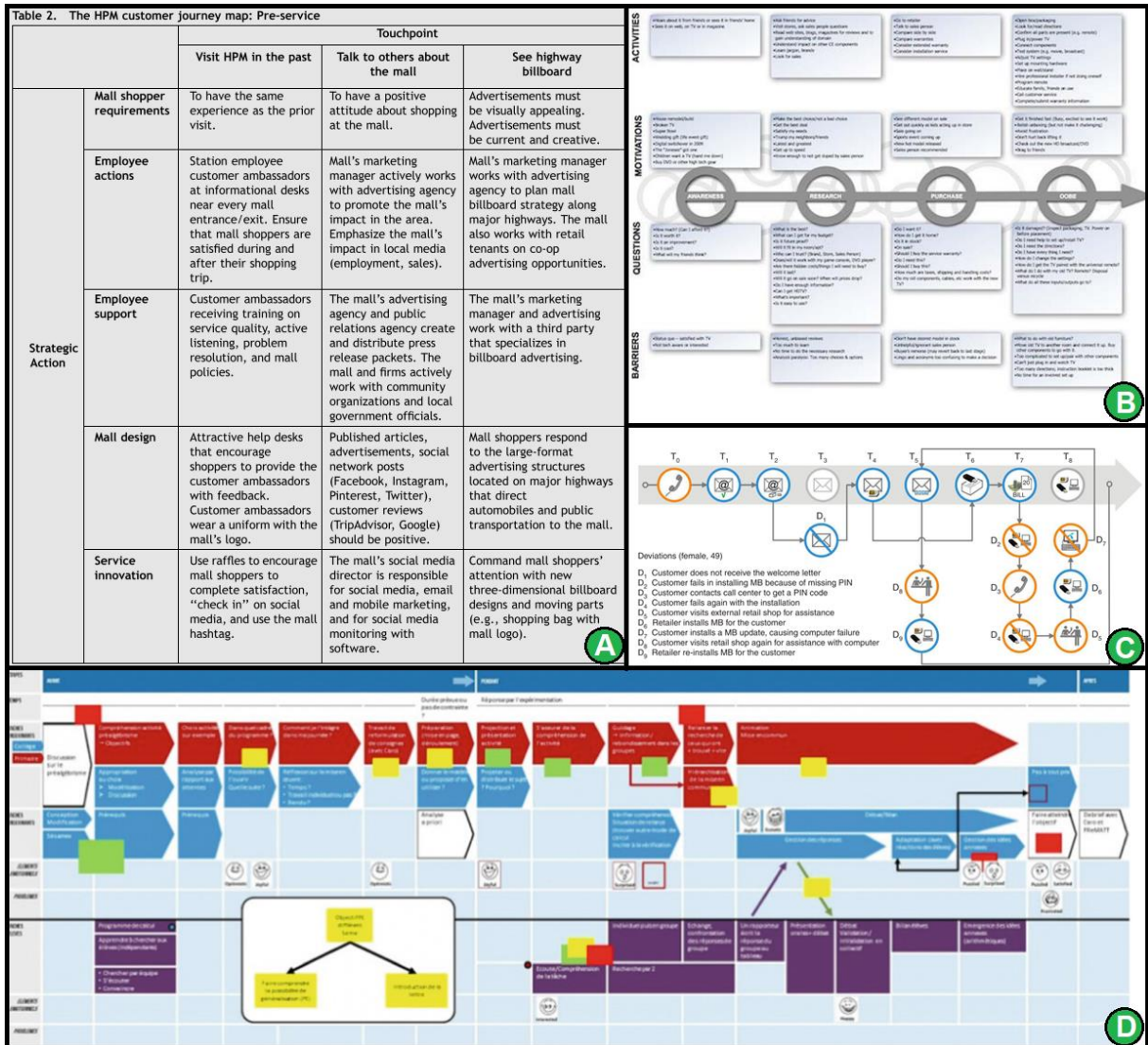
Another consideration in the analysis is to gather users’ data (HALVORSRUD; KVALE; FØLSTAD, 2016; KAPLAN, 2016; PONSIGNON; DURRIEU; BOUZDINE-

CHAMEEVA, 2017) and draw the customer journey map. For Lemon and Verhoef (2016, p. 79), “Customer journey analysis should understand and map the journey from the customer perspective and, therefore, requires customer input” (LEMON; VERHOEF, 2016, p.79). Nonetheless, the authors diverge on the way data is collected. First, Dove, Reinach, and Kwan (2016) suggest that the customer has to develop their own journey. Second, Rosenbaum, Otalora, and Ramírez (2017) have created the customer journey map together with the company’s management, filtered the most important one according to them, and only then evaluated with customers whether those touchpoints corresponded to the actual customer journey map or not. On the other side, Halvorsrud, Kvale, and Følstad (2016) have constructed the planned customer journey map, likewise Rosenbaum, Otalora, and Ramírez (2017) by filtering some touchpoints but, instead of adopting a survey to test how is customers’ behavior, they asked customers to report their actual journey. The divergence appears too on the type of data collected, being just objective touchpoints stated (e.g., chronological details and channels) or includes motivations, feelings, and possible barriers (RICHARDSON, 2010; KAPLAN, 2016).

After all requirements, data and perspectives have been collected, the map can be drawn. Until the moment, there is not yet a recognized pattern in the literature among authors. Figure 1 has some examples of customer journey maps to illustrate how different they are.

Lastly, the customer journey has been analyzed, which includes: the comparison of the planned and actual journey (HALVORSRUD; KVALE; FØLSTAD, 2016); the identification of gaps during the customer journey (HALVORSRUD; KVALE; FØLSTAD, 2016; PONSIGNON; DURRIEU; BOUZDINE-CHAMEEVA, 2017); the identification of main touchpoints for the customers (ROSENBAUM; OTALORA; RAMÍREZ, 2017), and strategic actions to be taken afterward (KAPLAN, 2016; ROSENBAUM; OTALORA; RAMÍREZ, 2017).

Figure 1 - Examples of journey maps



Source: A) (ROSENBAUM; OTALORA; RAMÍREZ, 2017, p. 147); B) (RICHARDSON, 2010, p. 3); C) (HALVORSRUD; KVALE; FØLSTAD, 2016, p. 854); D) (SPERANO et al., 2019, p. 972)

3 METHODOLOGY

To investigate how a customer journey provides insights in a PSS from a customer's perspective, this research has proposed to compare two different customer journeys with the application of a case study, one developed with what the company imagines and has planned (planned customer journey) and another reported by the user (actual customer journey). The step-by-step from the methodology was joined into three phases, and it is represented in Figure 2.

Figure 2 - Research steps

Phase I - Studies and Preparation	<div data-bbox="405 779 716 815" style="border: 1px solid black; padding: 2px;">1.1 Literature Review</div> <div data-bbox="405 853 716 987" style="border: 1px dashed black; padding: 2px;">PSS. Customer Journey. Database: Scopus and Web of Science.</div>	<div data-bbox="751 779 1062 815" style="border: 1px solid black; padding: 2px;">1.2 Interview Protocol</div> <div data-bbox="751 842 1062 1010" style="border: 1px dashed black; padding: 2px;">Develop an interview protocol based on the literature review to be applied to the company and customers.</div>	
Phase II - Customer Journey Map (planning and designing)	<div data-bbox="405 1099 716 1135" style="border: 1px solid black; padding: 2px;">2.1 Search</div> <div data-bbox="405 1162 716 1330" style="border: 1px dashed black; padding: 2px;">Find companies with a PSS as one of the business models, select one, and contact to check availability.</div>	<div data-bbox="751 1099 1062 1135" style="border: 1px solid black; padding: 2px;">2.2 Investigation</div> <div data-bbox="751 1173 1062 1308" style="border: 1px dashed black; padding: 2px;">Research about the company via secondary sources (e.g. company's website).</div>	<div data-bbox="1094 1099 1406 1135" style="border: 1px solid black; padding: 2px;">2.3 Interview</div> <div data-bbox="1094 1173 1406 1308" style="border: 1px dashed black; padding: 2px;">Interview first with the company, then with the customers based on the interview protocol.</div>
Phase III - Data Analyses	<div data-bbox="405 1637 716 1673" style="border: 1px solid black; padding: 2px;">3.1 Analyses</div> <div data-bbox="405 1711 716 1812" style="border: 1px dashed black; padding: 2px;">Take insights into an analysis of the data collected.</div>	<div data-bbox="751 1637 1062 1673" style="border: 1px solid black; padding: 2px;">3.2 Consolidation</div> <div data-bbox="751 1688 1062 1845" style="border: 1px dashed black; padding: 2px;">Contact the company one more time to consolidate the analyses as well as the journey maps.</div>	<div data-bbox="1094 1637 1406 1673" style="border: 1px solid black; padding: 2px;">3.3 Discussion</div> <div data-bbox="1094 1711 1406 1812" style="border: 1px dashed black; padding: 2px;">Understand the result and take conclusions from the case study.</div>

3.1 Phase I – Studies and Preparation

The first part began with a non-exhaustive literature review. This literature coverage has restricted, no pre-determined, and specific sources (CORDEIRO et al., 2007). To support the study, some databases (Scopus, Web of Science) and ResearchGate as a platform were used to find some articles. The goal was not to enumerate as much data as possible, but the most relevant ones, making this type of review more subjective (CORDEIRO et al., 2007).

About the content, the literature review has focused first on PSS as a business model, investigating its different types and the relationship between PSS and some of its stakeholders. Subsequently, the research has investigated the customer as the main subject with user-centered design (UCD) and examined a specific method, customer journey. The customer journey was the last topic revised, exploring the many structures and analysis. For this study, the literature review had provided concepts and ideas to develop the customer journey map and its analysis.

To compare planned and actual customer journeys, a case study has been developed with a company called Londrigás. According to the concept from Goedkoop et al. (1999), the company corresponds to a PSS, and it is classified as use oriented by the designation from Tukker (2004). A case study has been the research method chosen because it can use multiple sources of evidence (VOSS; TSIKRIKTSIS; FROHLICH, 2002), such as documents or interviews with people involved in the event, and observe the events directive (YIN, 2009). One of the advantages of interviews is flexibility, which allows the interviewer to clarify possible misunderstandings and is efficient in understanding humans' behaviors (GIL, 2008). Inside the case study field, it has been decided to use a monographic method, which studies a single case deeply and allows other researchers to apply it later for similar cases (GIL, 2008). This study also intends to be exploratory research. Since PSS and customer journeys were not fully studied together, exploratory research has aimed to clarify ideas and concepts not yet extensively studied (GIL, 2008).

3.2 Phase II – Customer journey maps (Planning and Drawing)

The second step was to contact the company by phone and determine if they were willing to participate in the research. A first interview with the company has been scheduled to collect the remaining basic information from the company; explain how the study would proceed; understand the company's business more in-depth; acquire data for the researcher to develop a customer journey map based on their answers, and; request possible clients to be interviewed.

The interviews have been done by video call with the company and by phone with the clients. A downside was that this condition might have affected one of the interview's advantages, the body language of a person (GIL, 2008).

As mentioned before, the company chosen for the case study is Londrigás. The company Londrigás is a small size gas distributor for retail and B2B company located in the south of Brazil. The criteria were based first due to the company's business model, a PSS, which corresponds precisely with the type of business focus of the study, and second, the accessibility to gather the necessary data.

Regarding the customers' data, a sample with three customers was used to avoid bias when comparing the results. The conversation has started with basic information questions and went next to questions related to their relationship with the business. This interview has intended to understand the chronological order of the events and emotions in each touchpoint. The interview protocol from the company can be found in appendix A, while the customer's interview protocol can be found in appendix B.

The employee who was interviewed for the research works at Londrigás since 2012 (8 years) and occupies the commercial manager position, responsible for the customers' prospection and support. About the client's basic information, two clients were a restaurant denominated as restaurant A and restaurant B, and the last interview was with a professional condominium manager responsible for three residential buildings (building 1, building 2, and building 3) since their launch. All interviewees are responsible for the gas orders and contact with the company. The clients' information is resumed in Table 2.

Table 2 - Clients' basic information

	Restaurant A	Restaurant B	Residential building		
			Building 1	Building 2	Building 3
Relationship time between company and client:	1 year	~ 30 years	1 year	1 year	7 months
An employee at the company's client:	since 2015	since 1995	for 1 year	for 1 year	for 7 months
Employee job's position:	Administrative coordinator	Administrative coordinator	Professional condominium manager		
The employee is responsible for the gas orders:	Yes	Yes	Yes	Yes	Yes

Based on the customer journey review and the purpose of the study, a few classifications of touchpoints were chosen to be applied and has been reflected in the interview protocol and the customer journey map. One of them is the division of touchpoint types proposed by Lemon and Verhoefl (2016): brand-owned, customer-owned, partner-owned, and social/externally owned. The classification has a strategic meaning to point out the responsible and, in contrast to the classification from Rosenbaum, Otalora, and Ramírez (2017), does not lose the graphical advantage of the customer journey. The discussion of further steps and strategic decisions has been left to the company and was not part of the study's scope (e.g., execution of a recommendation or change in the journey map by adding and subtracting touchpoints). Another classification to be used is emotions and feelings, from Richardson (2010). The concern to customers' feelings intensify the perception in the research from the customer experience and might reveal a complete overview of the touchpoints, other than only a structural or chronological view. On the same direction of many authors

(LEMON; VERHOEF, 2016; ROSENBAUM; OTALORA; RAMÍREZ, 2017; VOORHEES et al., 2017), time is the last classification and has been divided into three parts: from the touchpoint of knowledge about the company until the first contact (PSS Knowledge), the period of the first contact until acquiring the PSS (PSS Building Process), and the period of engagement with the PSS (PSS Engagement). Unlike other businesses with a defining moment of pre-acquisition, acquisition, and post-acquisition of a product/service, PSS intends to have continuous use and contact between the parties. For this reason, it has been decided to divide time in those three different ways.

3.3 Phase III – Data Analyses

The collected data from three customer interviews have been compiled, and one customer journey map has been drawn as the actual customer journey map. Information from the company's interview was equally compiled and classified, denominating the planned customer journey map.

As mentioned before, it has been used the following classifications to analyze the customer journey map:

- 1) Brand owned, customer-owned, partner-owned, and social/externally owned touchpoints(LEMON; VERHOEF, 2016).
- 2) PSS Knowledge, PSS Building Process, and PSS Engagement.
- 3) Actions, motivations, questions, and barriers (RICHARDSON, 2010).
- 4) Planned and actual customer journey map (HALVORSRUD; KVALE; FØLSTAD, 2016).

The analyses' objective was to find any relevant distortions or differences between the planned and actual journey maps. Those differences might include, but it is not limited to:

- 1) Identify gaps in the customer journey.
- 2) Identify different paths taken by the customers.
- 3) Identify new touchpoints.
- 4) Understand customers' emotions and remarkable touchpoints.

5) Identify critical touchpoints in the journey.

Another interview by video call has been made with the company to present and confirm the customer journey maps to consolidate the results. A presentation with the relevant information has been displayed for the company, and general questions over the results have been raised.

4 RESULTS

This chapter presents the case study of Londrigás and an analysis of the customer journey map. The results start with a description of the business model from the company and are followed by the presentation of the planned customer journey map, the actual customer journey map, and a comparative analysis of both. Finally, it discusses the impacts of the pandemic caused by Covid-19, future projects planned by the company to increase the customer experience, and suggestions for improvements.

4.1 Londrigás Business Model

The case study was based on Londrigás, a small size company located in Londrina, State of Paraná, in the south of Brazil and founded in 1977. One interview with an employee from the company and three clients were carried out. The clients interviewed were two restaurants, also located in Londrina, and a third client representing three residential buildings.

About the company's business model, Londrigás is a gas distributor (LPG – Liquefied Petroleum Gas) in bottles for retail (e.g., restaurants and residential buildings). With 15 employees, the company is divided into four areas: financial, secretariat, logistic, and client prospection (together with customer support).

According to the company's employee, the value proposition is to deliver the best gas support for the client, which does not necessarily imply the market's lowest price. The value proposition has also been observed as motivations from the clients to keep their loyalty with the company.

Regarding customer segmentation, the company currently defines the clients according to the amount it pays and how much it consumes. Previously, the classification was only by gas consumption per company's visit. Once they had realized some clients ordered less gas and more frequently (bringing more revenue for the company) and were not mapping those clients, they have changed their segmentation. Another classification is by the type of business of their client: residential buildings and restaurants.

When asked about how the distance affects the customer relationship, the company has told the only clients they supply are in Londrina's metropolitan region. Inside the area, the location only has a small influence on the price due to logistics costs.

Related to partnerships and outsourcing services, the company had spoken about no outsourcing and two partnerships. The partnerships occur only with companies that administrate residential buildings and sometimes with the maintenance of connection systems between the gas bottle and the clients' kitchen or condominium gas system, for example. As will be seen later, the clients reported some maintenance of the system was made by the company, without requiring a third party.

The communication channels are being planned to expand, but, nowadays, the company uses WhatsApp, phone, and email, depending on the client and the situation, although it is mostly by phone. The contact from the company to the client usually occurs periodically (weekly, biweekly, or monthly), also according to each client, due to the schedule of new deliveries, and to check how is the situation of gas stock from the client.

The company's business model is referred to as use oriented PSS, according to Tukker (2004). The bottle is the product from the business model, and it is provided by the company under a lending regime, while the service is the supply of gas, the system's installation, and the maintenance. The company charges the client by a fixed amount related to the supply of gas via the bottle and the system installed. Residual gas inside the bottle turns into a discount for the next period. The company reported a third company was making the maintenance of the tubes and connections between the bottle and the clients' exact point of use of the gas. Nonetheless, clients reported during the interviews that Londrigás paid for the whole integration system, the bottle, and some clients said the maintenance is made by the company whenever some problem is detected (either in the bottle or at the system).

4.2 Customer Journey Map – Planned

The collected data to draw the planned customer journey map has been gathered by a video call interview with one of the company's employees. Based on the interview protocol with the company, a customer journey map was drawn in software (draw.io), and it is shown in Figure 3.

The planned customer journey map from Figure 3 starts with PSS Knowledge. The company has described four different ways that the client first knows about them (cold call from the company, recommendation, google research, and by seeing the company's truck delivering gas around the city). After the first contact, the company and the possible new client keep communicating with each other until the acquisition of the PSS, during the phase of the PSS Building Process. Usually, in this phase, the possible new client searches for other gas distributors companies to compare. When possible new clients decide to acquire the PSS, she/he starts the PSS Engagement phase. As shown in Figure 3, the engagement occurs cyclically and continuously until one of the parties decides the relationship is over. That cyclically customer journey is a characteristic of PSS and has not been seen in other literature examples.

Besides the planned customer journey map, Figure 3 additionally shows a legend with some abbreviations, symbols, and the classification of touchpoints adopted by (LEMON; VERHOEF, 2016). The extension of the customer journey map with the classifications of (RICHARDSON, 2010) is in Figure 4.

The planned customer journey map in Figure 4 suggests a few motivations, emotions, doubts, and barriers in each phase. From the company's perspective, the PSS Knowledge shows that what motivates the clients to know the company can be divided into three main points: price, customer support, and reliability. Some of the questions and barriers in this phase reflect the emotions of the clients imagined by the company: dissatisfaction related to previous gas distributor company and being afraid of changes. During the PSS Building Process, the motivations remain to understand the company better. Doubts are more concentrated on operational and financial questions, rather than feelings from the customer. Additionally, barriers are mostly reported by competition with other players in the market. In the last phase, motivations

from PSS Engagement reflects the feelings of security, while barriers and questions from the customers tend to concentrate on the operation and financial situation from Londrigás' clients.

Figure 3 - Planned Customer Journey Map (1/2)

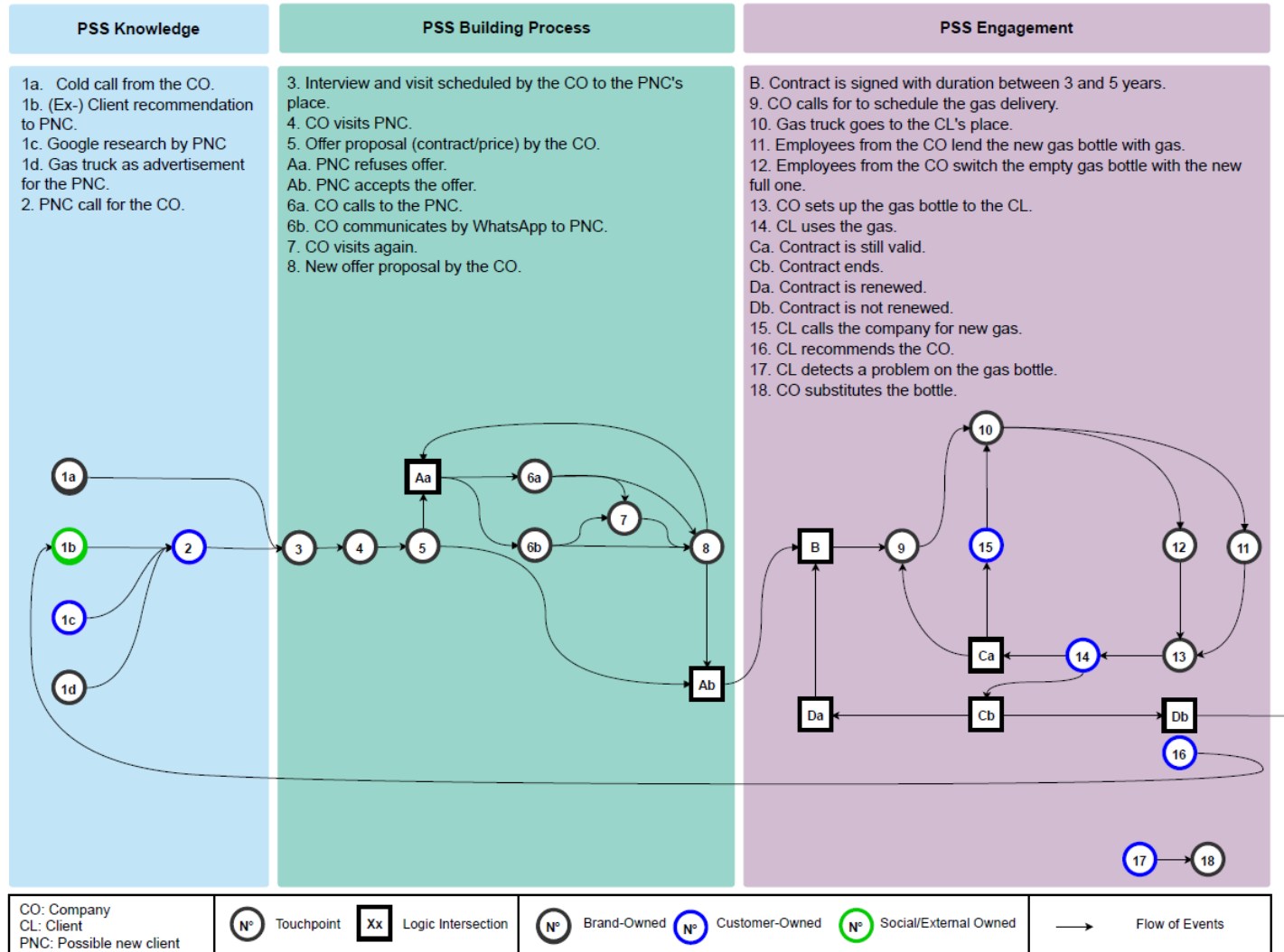


Figure 4 - Planned Customer Journey Map (2/2)

	PSS Knowledge	PSS Building Process	PSS Engagement
Motivations	<p>Search for better price. Search for better customer support. Search for a reliable company.</p>	<p>PNC wants to know more about the CO</p>	<p>CL wants security to always have available gas in its place: More gas as prevention; Gas is over;</p>
Emotions/Feelings	<p>Dissatisfaction Angry Afraid of changes Safety Curiosity Thoughts of change</p>	<p>Security Desire for hospitality in a company</p>	<p>Security.</p>
Questions/Doubts	<p>Doubts about: products' quality, customer support, whether the CO is a local company (also related to customer support), doubts if the CO is well-known. If PNC is totally new on business, doubts about: price, how gas distribution will work, what type of gas bottle she/he needs.</p>	<p>Logistic Price</p>	<p>Time and date the gas will be delivered. Price of gas bottle.</p>
Barriers	<p>Contract with other gas distributor. Comfortable with current gas distributor. Afraid the logistic of gas distribution might be different. Price.</p>	<p>Number of competitors. Other proposals of gas distribution. Short time to receive the company. PNC needs approval from boss of condominium council to sign the contract.</p>	<p>CL has not finish gas bottle yet. CL does not have money to pay the CO.</p>

4.3 Customer Journey Map – Actual

To draw the Actual Customer Journey Map, it has been selected three clients from Londrigás. In Figure 5, the customer journey map compiles the perspective of three different customers. The orange items represent the actual customer journey map, with extra touchpoints, while the white items are the planned customer journey map previously shown and not mentioned by the customers.

The actual customer journey map in Figure 5 already starts differently from the planned journey. Rather than four different paths to have the first contact with the company, the clients have informed just the recommendation by another person. During the PSS Building Process, the planned and actual customer journey map were equivalent. The PSS Engagement had more disparity, with more touchpoints being reported by the clients. Because clients interviewed either did not have contracts or were clients for a short time, there were not touchpoints related to contracts' renewability or end of the engagement. Similarly, as with the planned customer journey map, the actual customer journey map extension is displayed in Figure 6.

The actual customer journey map in Figure 6 indicates the actual feelings from the customers during each moment of the journey map. The motivation in PSS Knowledge is in line with the motivations reported by the company. Barriers, questions, and doubts focus on the operational system (usually different from the previous gas distributor), and the tension to not renovate the contract with the last gas distributor. During the PSS Building Process, the expressed motivations were the system installation free of charge, which has been approached in the subchapter of customer experience improvements. The questions from the customers are still over the operation of the system. The causes of barriers have been revealed as the date scheduled to install the system, and the competition, again reported by the company. By last, the motivations to retain the clients with the PSS during the PSS Engagement are like the ones that have motivated the client to search for Londrigás in the PSS Knowledge phase. Unlike what was expected from the questions and barriers, the clients' frequent questions were reported as being entirely solved by the company,

without remaining doubts. Consequently, the questions turn out to be a company's strength.

Figure 5 - Actual Customer Journey Map (1/2)

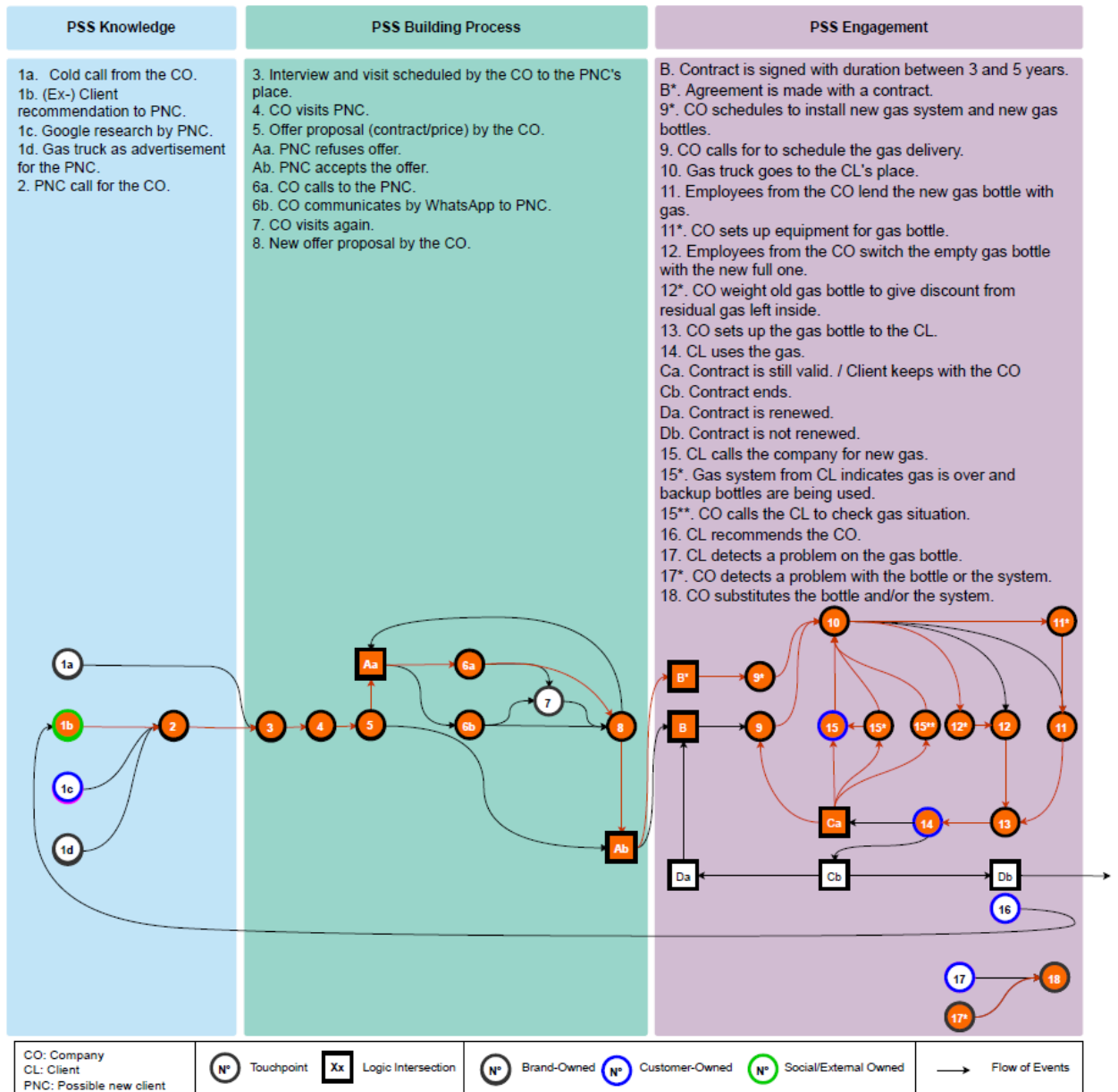


Figure 6 - Actual Customer Journey Map (2/2)

	PSS Knowledge	PSS Building Process	PSS Engagement
Motivations	<p>Search for better price. Good customer support and care. Bad customer support from previously gas distributor.</p>	<p>No cost with system installation.</p>	<p>CL always wants available gas in her/his place. Customer support and care quality. Partnership. CO takes care of the equipment lent to the CL. CO makes maintenance with fair price.</p>
Emotions/Feelings	<p>Tension to cancel old contract. Concerned about change in distributor. Enthusiastic with new technology of gas distribution.</p>	<p>Trust and security: Earned along the process</p>	<p>Relaxed after gas system was installed Happy: while everything is working. Trust: earned through time. Joy: CL likes a specific truck driver. Welcome: Receives attention from the CO. Carefulness: CO takes care of the equipments lended to the CL.</p>
Questions/Doubts	<p>Doubts about change in gas distributor and size of the gas bottles. Doubts about pressure from gas bottle not be enough with the change. Concern about being the one responsible for the change in gas distributor.</p>	<p>System different from previous one. Needed to adapt and understand how it works.</p>	<p>Whenever the CL has questions or competitors offers something to change, the CL consults the CO and trusts the CO gies the best advice, warning from good and bad "points" of the competitors. - CO teaches about gas when any questions emerge.</p>
Barriers	<p>Contract with previous gas distributor.</p>	<p>Other proposals of gas distribution. Be without gas for one lunch (restaurant client) for change in gas system.</p>	<p>x</p>

4.4 Customer Journey Map Analysis

The analysis has been divided into three parts. First, the comparison between the actual customer journey map and the planned customer journey map has been discussed. Then, it has been commented on some impacts from the pandemic of Covid-19. Finally, it has been explained future projects, suggestions for improvement from the clients and the author, and the company's feedback about those suggestions.

4.4.1 Planned x Actual Customer Journey Map

Like what has been exposed in literature, the number of touchpoints reported by the customers exceeded the ones reported by the company. The extra touchpoints were identified with one or two asterisks in Figure 5 (actual customer journey map), according to the number of options for the same touchpoint. A touchpoint unanimously reported by the customers and missed by the company was related to the gas bottle system that indicates whenever a group of gas bottles is empty, and the backup bottles are turned on. This mechanism was also communicated as an innovation compared to previous gas distributor systems used by the client.

A relevant touchpoint diverged by the company and some clients is the existence of a contract. Even though the company revealed clients do have a loyalty contract, two out of three clients stated they did not have a contract, and one of them told the possibility of a loyalty contract could have reduced the price he pays but, instead, he chose to pay a bit more and has the freedom to change the gas distributor whenever he wants.

On the PSS Knowledge phase, although the company reported four different paths the client has met with Londrigás, in the actual journey map, all of the clients said they had found the company through an indication of an ex-client. Even if a more significant sample of clients could bring a more explicit confirmation, the company should be aware its clients tend to come from indications. As will be seen in the last subchapter, the company has future projects to expand marketing channels for the first contact with the clients, and an alternative is to drive those projects so that it can be aligned with the clients' most common touchpoints from PSS Knowledge.

The brand-owned touchpoints surpass other ownerships, such as customer and external owned. This happens in the planned and actual customer journey map, and it is probably caused by either the business model of the company or the more active participation of the company during the whole process of interaction with the clients. In both hypotheses, the company usually guides the course of the touchpoints and provides an advantage once Londrigás has more control over the situations.

Motivations, emotions, barriers, and doubts have been useful tools to compare the actual and planned customer journey map. In the PSS Knowledge phase, it can be noticed that both customer journey maps are aligned. Still, in the PSS Knowledge phase, there are some doubts and questions about Londrigás reported by the clients, however, the motivations during the PSS Engagement phase show those possible problems regarding doubts and questions are being avoided.

During the PSS Building Process phase, the clients had spoken different barriers and questions from the company, such as when the installation of the gas system was scheduled. If the company identifies a way to overcome this barrier, that can increase customer experience.

At last, within the PSS Engagement phase, the emotions described by the clients, their motivations to keep with Londrigás, and even their questions about the system have demonstrated the company serves what it is considered as its value proposition.

4.4.2 Pandemic impacts

During the pandemic period, the company employee and some clients have stated Londrina city has closed restaurants and other places for only a short period due to social isolation measures. Hence, some of the possible national effects of the pandemic have been mitigated.

When asked about the effect of the pandemic for the company, the prospection of new clients has been mentioned as the first problem. Most of the possible new clients did not want visits from the company, just calls by phone during the pandemic and, for this reason, the number of clients prospected was fewer than before. Referring

to the customers-owned touchpoints, it did not change the communication with the company, probably because of the timeframe and intensity of social isolation measures. The last impact of the pandemic reported by the company was the number of people requesting discounts. One of the possible causes might be the decrease in customers from Londrigás' clients.

A difference between what the company reported and the clients about the pandemic was related to the time between touchpoints. From the company's point of view, there was no change in time. However, the two restaurants reported they had increased their time window to order new gas bottles due to a decrease in clients. The condominium manager said gas consumption has increased during the period, but it was unnecessary to decrease the time between new orders. In general, no substantial changes have happened.

4.4.3 Customer Experience Improvements

Here it has been discussed a few improvements manifested by the company and by the clients. After that, some observations related to the customer journey map has been exposed. It is important to mention the suggestions for improvements were recommendations for the company and has been presented to the company on a second call. The intention was for the company to beware of specific aspects of the customer's interactions, and later choose which ideas can be implemented. Along with the suggestions, it has been presented the feedback from the company.

Ongoing projects to increase customer experience are being developed by Londrigás. The goal reported is to improve marketing and advertisement to reach new customers and become more well-known in the city by using Instagram, Google Ads, Facebook, and billboards around the city. Therefore, it is expected for the possible new client to feel more confident about the company, with the company appearing as more reliable.

From the customers' point of view, three suggestions were made that could be developed and could have improved their customer experience. A different client made

each suggestion and the feasibility has been clarified by the company on the second interview.

The first client suggested a mechanism that could automatically warn the company when the gas is over, and the company would substitute the bottle without the touchpoints of calling and scheduling a date for the change. This suggestion was reported as the current situation by another client (residential client). On the second talk with the company, it has been explained that what happens with the residential client does involve calls from the company, as it is currently impractical to have electronic devices close to the gas systems that could make it possible.

The second client had an idea for the company to install individual gas as a courtesy to residential buildings once most buildings do not come with it. The positive impact for the customers of a residential building would come from the unnecessary investment of them and stop sharing the gas account equally between the residents. During the presentation, the company has been informed about the possible implementation and should be aware of the trade-off between costs and the increase in customer experience. In response, the company has acknowledged that its costs would not do the business with the client profitable, and most of the residential buildings nowadays already come with the individual gas meter.

The last client complained about a change in schedule. Previously, every Saturday the company changed the gas bottles and suddenly changed to Friday at lunch without prior notification. Although the situation has been back to normal (Saturdays mornings), the feedback for the company is to always consult clients before major changes. The company has agreed that this situation happens sometimes, and they will try to avoid it.

An aspect of the process mentioned by the company was related to maintenance. They have imagined the cost-benefit to maintain the gas bottles, and the system was not worth it anymore. On the other side, the customers reported the maintenance and care with the bottles, and the system was one of their motivations to keep as a client (Figure 5). It has been recommended for the company to consider the additional information when evaluating if the change in service will bring more benefits

or not. On the other side, during the second call, the company informed that the costs to keep that maintenance all the time were high, and they would either charge a more expensive service or take a financial loss. Additionally, Londrigás has revealed the work time decreased from 7 days to 5 and a half days per week. Furthermore, the company said it still does maintenance, but only in emergency cases for its clients.

Another aspect of the customer journey is loyalty contracts, which legally keep the client with the gas distributor. However, as observed from the interviews and the actual customer journey map, some clients preferred to pay more and not have this contract. This other divergence between the company's and the clients' point of view suggests it might be good for the company to explore more and evaluate if it is necessary and positive or if the lack of contract could be a differential factor from its competitors. Londrigás has justified it, with the absence of contracts only happening when they trust the client or has been a client for a long time. Contracts have been clarified as a critical resource since they prevent new clients from changing their gas distributors as soon as they receive a better price proposal. Consequently, the contracts give the company a chance to negotiate and prevent the client from leaving the company.

Finally, based on a comparison between the two journey maps, it has been identified touchpoints to increase and decrease the company's focus. The most relevant recommendations are for the PSS Knowledge, where all clients interviewed have been referred to the company by other clients. This could reveal an opportunity to develop the others touchpoints not cited by the clients, as it does not have significant impact on customers yet. Another possibility is to Londrigás explore more the touchpoint related to clients recommendations and reduce efforts in other touchpoints, such as the cold calls. Instead of cold calling to prospect new clients, an alternative of the intensification of cold calls could be for the company to call current clients, understand how the customer support can help them, and stimulate the clients to recommend the firm. This would increase the clients' experience because customers are motivated by customer care and have the potential to lead more clients to Londrigás. The company, in return, said it would study this option for the future.

5 CONCLUSION

The study is an analysis of a customer journey map in a usage-focused product-service system. After a brief literature review addressing the two subjects, a case study has been developed by interviewing a company and its clients to identify their point of view of the customer journey. This study contributes to the literature and practice in five aspects:

- The customer journey map explicitly displays the continuous interaction between the company and the customer during the engagement phase, one of the advantages of a product-service system.
- The case study contrasts the view of the company and the customers, avoiding mistaken conclusions from only one side. This analysis has allowed identifying missed touchpoints by the company (like the weighing of residual gas), and various overviews from the customers' feelings.
- The analysis has also helped the company to understand which touchpoints are critical or less relevant for the customers. The company has been recommended to invest more time in essential touchpoints that should attract more clients.
- Suggestions to increase customer experience were made by the clients and by the author based on the results achieved, like removing contracts and prior communications of relevant operational changes to the clients.
- The impacts of the pandemic of Covid-19 has been questioned to the customers and the company. It has been identified little influence on this customer journey once Londrigás is considered an essential business and it has not been imposed completely closures.

As with any other research, this study has some limitations. The face-to-face interviews could not be possible because of social isolation measurements due to the pandemic situation. Although some benefits for interviews in person were lost, the issue has been bypassed with interviews by video and phone calls without losing content from the questions. Another limitation was the number of clients interviewed.

A more significant number of clients could confirm the actual customer journey map and bring more views of their emotions and feelings. Still, three clients have presented good touchpoints' matchings, without many divergences of journeys, and similar feelings in each phase of interactions.

About the methodology, even though it was a single case study, it has been studied the company's business model and its perspective of the customer journey deeply, along with interviews with customers, which has brought both sides of the business. The research can be applied for similar cases and, as some PSS diverges from others, further research on the field is recommended to explore how other categories of PSS could be supported, such as product-oriented or result-oriented.

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APPENDIX A

Interview Protocol - Company Londrigás - Interview I				
Topics	Subtopics	Questions	Data to be analyzed	References
Company's basic information	-	<p>When was the company founded?</p> <p>How many employees does it have?</p> <p>Are the internal departments well defined? If yes, which are they?</p> <p>Does it have a specific division related to customer management relations?</p>	Company's size, internal divisions, and time operating	-
Interviewee's information	Job position	What is your current position?	Understand the interviewee's knowledge about the company.	
	Job's responsibilities	Which areas are you responsible for?		
	Time in the company	How long have you been working for company Londrigás?		
Business model	Revenue streams	<p>What are the business models from the firm?</p> <p>Which revenue streams does <i>PSS business model 1</i> have?</p>	Identify and segment different business models' types to choose one to focus on during the interview.	(OSTERWALD; PIGNEUR, 2011)

	Value proposition	What is the company's value proposition?	Differentiation between the company and its competitors.	
	Customers – Segmentation	Are the customers the final user? Do you classify your customers? If yes, how? Does the customer's location affect the relationship between the company and the client? If yes, how?	Identify different customers/users' segmentation and classifications and understand if the customer is the final user	
	Customers - Target Market	Which characteristics, according to your classification, does your customer have?	Gather data that shall be used to classify different customer journey maps	
	Key partners	Does the company have partnerships? What about outsourcing services?	Identify possible touchpoints out of the company	(LEMON; VERHOEF, 2016)
	Channels	Which communication channels with the customer does the company currently have? How frequent do you contact the client? What are usually the reasons for communication? Do you use a specific channel more than the others? If yes, which one?	Collect possible communication channels and touchpoints from the company	(OSTERWALD; PIGNEUR, 2011)

Interview Protocol - Company Londrigás - About the Customer Journey				
Time Division	Topic	Questions	Data to be analyzed	References
PSS Knowledge	Actions	Could you enumerate the moments you believe the customer got in touch with the brand or the company during the first knowledge about the company?	Chronological events	(RICHARDSON, 2010)
	Motivations	What the company believes it was motivating the customer to go through PSS Knowledge? Which emotions were involved?	Customers experience in each touchpoint	
	Questions	During the PSS Knowledge, does the company think the client had any questions? What are the main questions the customer must go during the PSS Knowledge?		
	Barriers	Which barriers or difficulties does the company think the customers might have that prevent or almost had prevented customers from moving to the next step? Maybe some difficult and complicated process, any kind of cost barriers related that might have influenced or transportation barriers.		
PSS Building Process	Actions	Like the first timeframe, could you list touchpoints between the company and the customer between the first knowledge until the acquisition of the product, service, or with the brand?	Chronological events	
	Motivations	What the company believes it was motivating the customer to go through PSS Building Process?	Customers experience in	

		Which emotions were involved?	each touchpoint	
	Questions	During the PSS Building Process, does the company think the client had any questions? What are the main questions the customer must go during the PSS Building Process?		
	Barriers	Which barriers or difficulties does the company think the customers might have that prevent or almost had prevented customers from moving to the next step? Maybe some difficult and complicated process, any kind of costs related that might have influenced or transportation barriers.		
PSS Engagement	Actions	For last, which touchpoints happened between the company and the customers during the engagement with the product and/or service?	Chronological events	
	Motivations	What the company believes it was motivating the customer to go through PSS Engagement? Which emotions were involved?	Customers experience in each touchpoint	
	Questions	During the PSS Engagement, does the company think the client had any questions? What are the main questions the customer must go during the PSS Engagement?		
	Barriers	Which barriers or difficulties does the company think the customers might have that prevent or almost had prevented customers from moving to the next step?		

		Maybe some difficult and complicated process, any kind of costs related that might have influenced or transportation barriers.		
Pandemic		<p>Which relevant information and touchpoints do you think it has changed from before the pandemic and now?</p> <p>How have the communication channels for the company changed?</p> <p>How do you think the pandemic has changed the customers' communication with the company?</p> <p>Did it have more barriers during the pandemic? If yes, which ones?</p> <p>How the delivery of value proposition changed?</p> <p>Did time between one touchpoint and the other change from before and now?</p> <p>How?</p>		
Future modifications		<p>Does the company have any ongoing projects, or will have relevant changes that might affect the customer journey shortly?</p> <p>If yes, what has motivated you to change?</p> <p>What do you think might change the customer experience?</p>		

APPENDIX B

Interview Protocol - Customers - Interview I				
Topics	Subtopics	Questions	Data to be analyzed	Reference
Demographic and geographic information	-	Which city are you located in? Other additional questions, according to the company's classification, will be made.	Gather data that shall be used to classify different customer journey maps	
Relationship between company and customer	-	How long have you been a customer from the company Londrigás? How did you know about the company?	Understand the connection between the company and the customer.	
Interview Protocol - Customers - Customer Journey				
Time Division	Topic	Questions	Data to be analyzed	Reference
PSS Knowledge	Actions	Could you enumerate the moments you got in touch with the brand or the company during the first knowledge about the company?	Chronological events	(LEMON; VERHOEF, 2016)
	Motivations	What was motivating you to go during the PSS Knowledge? Which emotions were involved?	Customers experience in each	
	Questions	During the PSS Knowledge, did you have any questions or doubts?	touchpoint	

	Barriers	Which barriers or difficulties did you have that prevent or almost had prevented you from moving to the next step? Maybe some difficult and complicated process, any kind of costs or transportation barriers related that might have influenced.		
PSS Building Process	Actions	Like the first timeframe, could you list touchpoints between you and the company during the engagement with the product, service, or with the brand?	Chronological events	
	Motivations	What was motivating you to go during the PSS Building Process? Which emotions were involved?	Customers experience in each touchpoint	
	Questions	During the PSS Building Process, did you have any questions or doubts?		
	Barriers	Which barriers or difficulties did you have that prevent or almost had prevented you from moving to the next step? Maybe some difficult and complicated process, any kind of costs or transportation barriers related that might have influenced.		
PSS Engagement	Actions	For last, which touchpoints happens between you and the company during the engagement with the product and/or service?	Chronological events	
	Motivations	What was motivating you to go during the PSS Engagement? Which emotions were involved?	Customers experience in each touchpoint	
	Questions	During the PSS Building Process, did you have any questions or doubts?		
	Barriers	Which barriers or difficulties did you have that prevent or almost had prevented you from moving to the next step? Maybe some difficult and complicated process, any kind of costs or transportation barriers related that might have influenced.		
Pandemic		Which relevant information and touchpoints do you think it has changed from before the pandemic and now?		

		Did the way the company communicates with you change? Did the frequency also change? Did time between one touchpoint and the other change from before and now? How?		
Changes		What do you think it could be different that would have increased your experience?		