CAMPUS SOROCABA

PROGRAMA DE PÓS-GRADUAÇÃO EM ENGENHARIA DE PRODUÇÃO

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Héctor Ángel Ramírez Navarro

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Urban logistics in Sao Paulo city a comparison between Top of the Pyramid and Base of the Pyramid regions

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Supervisor: José Geraldo Vidal Vieira

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UNIVERSIDADE FEDERAL DE SÃO CARLOS

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Orientação: Prof. Dr. José Geraldo Vidal Vieira

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Abstract:

The fast expansion of urban areas poses challenges for Fast-Moving Consumer Goods (FMCG) companies who want to provide products to small retailers, especially in the last-mile delivery, which is a complex process that is hindered by factors such as transit regulations; city infrastructure; and safety. These factors have different levels of impact, between high-income and low-income neighborhoods and are more evident in megacities in developing countries, where it exists a clear division between classes. On one hand, governments do not attend low-income neighborhoods, where it exists a strong presence of unsafe areas, lack of planning, and infrastructure that hinders the deliveries of FMCG. On the other hand, traffic regulations in high-income neighborhoods make the delivery process more complex. This study aims to analyze the urban logistics by comparing low-income and high-income neighborhoods in Sao Paulo city, by taking into account local businesses, buying consumer behavior, and the distribution process. To achieve this, a questionnaire in loco will be applied to the stakeholders involved (consumers, small retailers, and carriers). The data will be analyzed by employing descriptive statistics in an exploratory and descriptive way. The results from small retailers, consumers, and carriers reveal that in their point of view the delivery of products is different between BOP and TOP. Factors such as the infrastructure of the neighborhoods hinder the delivery of products from companies to small retailers in TOP regions, while in BOP regions small retailers' security and infrastructure are the major problems in the point of view of the actors.

Keywords: Urban logistics, Megacities, Developing countries, Last-mile

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1. INTRODUCTION

1.1 Contextualization

For the first time in human history the majority of the world's population lives in urban areas, nowadays it represents 55% of the population, and by the year 2050, the percentage will increase to 68% (UNDESA, 2018). While it is true that this trend is noticeable all around the world, the consequences linked to the fast-growing population are more evident in developing countries, where migration of people from small cities to urban areas has accelerated urbanization. A few examples of this are New Delhi, Shanghai, Mexico City, and Sao Paulo. All of them are megacities in developing countries; which are among the top five most populated cities in the world.

The increase of the population of megacities in developing countries has brought new challenges for delivering Fast-Moving Consumer Goods (FMCG) to small retailers, which are one of the most popular retailing stores in these countries. Especially when it comes to the last-mile delivery, this is a process that happens inside the city and is considered the most expensive part of the distribution, costing as much as 28% of the whole delivery cost (Wang, et al 2016). For small retailer owners, it is important to keep their stock filled with merchandise to fulfill their customer needs; to achieve this it is necessary to collaborate with companies and carriers to consolidate the delivery of these products.

Also, to accomplish these deliveries, urban freight vehicles are necessary, the use of these vehicles is so popular that it can account for one-fourth of the street traffic in a city (Butrina, Girón-Valderrama, Machado-León, Goodchild, & Ayyalasomayajula, 2017). This high flow of freight vehicles contributes to city problems such as an increase in car accidents, air pollution caused by CO_2 emissions, and traffic congestions (Iwan et al., 2018). At the same time, freight transportation faces problems such as accessibility for delivering vehicles due to the lack of loading and unloading zones, high fuel consumption, and risks of cargo theft (McKew, 2003).

Besides, the regions where the retailers are located have a strong influence on the process of last-mile delivery. For example, in the case of low-income regions, it exists a high probability that the distribution of goods could be interrupted by problems of security or crime (Fransoo & Blanco, 2012). Also, these regions are often omitted from official maps or hidden by authorities, which directly affects their accessibility (GLOBAL URBAN OBSERVATORY, 2003). It is important to remark that in the academic literature the term used to address this population is the Base of the Pyramid (BOP). The term was introduced by Prahalad, (2005) to define the poorest and the largest socio-economic group in today's world society. The BOP has a lack of private and public services such as public lighting or sewerage, making the available services more expensive than other parts of a city (Hammond, Kramer, Katz, Tran, & Walker, 2013).

On the other hand, the delivery of FMCG to the wealthiest regions or Top of the Pyramid (TOP), face problems related to urban transit restrictions. Ironically, governments create these restrictions in an attempt to decrease traffic. This directly affects how the deliveries of products are performing. The most common restrictions applied to freight vehicles are time windows (Dablanc, 2007), loading zones (Muñuzuri, Cuberos, Abaurrea, & Escudero, 2017), access restrictions (Muñuzuri, Larrañeta, Onieva, & Cortés, 2005), night deliveries (Holguín-Veras et al., 2018), and weight or size restrictions of the freight vehicles (Swiatek et al., 2014). However, some of these incentives and restrictions are created locally, which means that they change depending on the city, besides most of them are obsolete (Dablanc, 2007) making the delivery process more complex and expensive. At the same time, the lack of collaboration between governments, distributors, and small retailers generate problems in the distribution system, making the process inefficient (Vieira & Fransoo, 2015).

Moreover, all the factors mentioned above have a different level of impact on the urban logistics of both regions (TOP and BOP). Thus, this study aims to evaluate and compare the perception of consumers, small retailers, and carriers located in low-income and high-income regions of the municipality of Sao Paulo. This will be

achieved by taking into account consumer behavior, local businesses, and the distribution process. The study will bring a new perception of these areas, by helping to identify the major problems related to FMCG distribution in the same way it aims to make an impact in the daily life of the people who live in these regions.

1.2 Definition of the Problem

The municipality of Sao Paulo is the fourth largest city in the world (UNDESA, 2018) and the economic capital of Brazil, the city has a GDP of 57, 071, 43 R$ per capita (IBGE, 2010). This megacity is located on the southeast of the country, inside the state with the same name. Sao Paulo has an extension of 1,521,110 km², and a population of 12,176,866 inhabitants. To facilitate the administration, the government divided the municipality in 32 boroughs (subprefeituras) as shown in Figure 1, which at the same time divides into 96 districts (distritos).

Moreover, the municipality of Sao Paulo along with the Sao Paulo Metropolitan Region (SPMR) has a population of 21,650,000 inhabitants, these territories concentrate almost 50% of the state's population and have a demographic density of 7,398.26 inhabitants/km2 (IBGE, 2010). The SPMR generates 17.7% of Brazil's GDP and 54.35% of Sao Paulo's GDP making it the wealthiest state of the country. Finally, Brazil's retail market has a strong presence of small retailers, in this country exists around 1 million of these stores (Díaz, Lacayo, & Salcedo, 2007).

Figure 1 - Boroughs of the Municipality of Sao Paulo
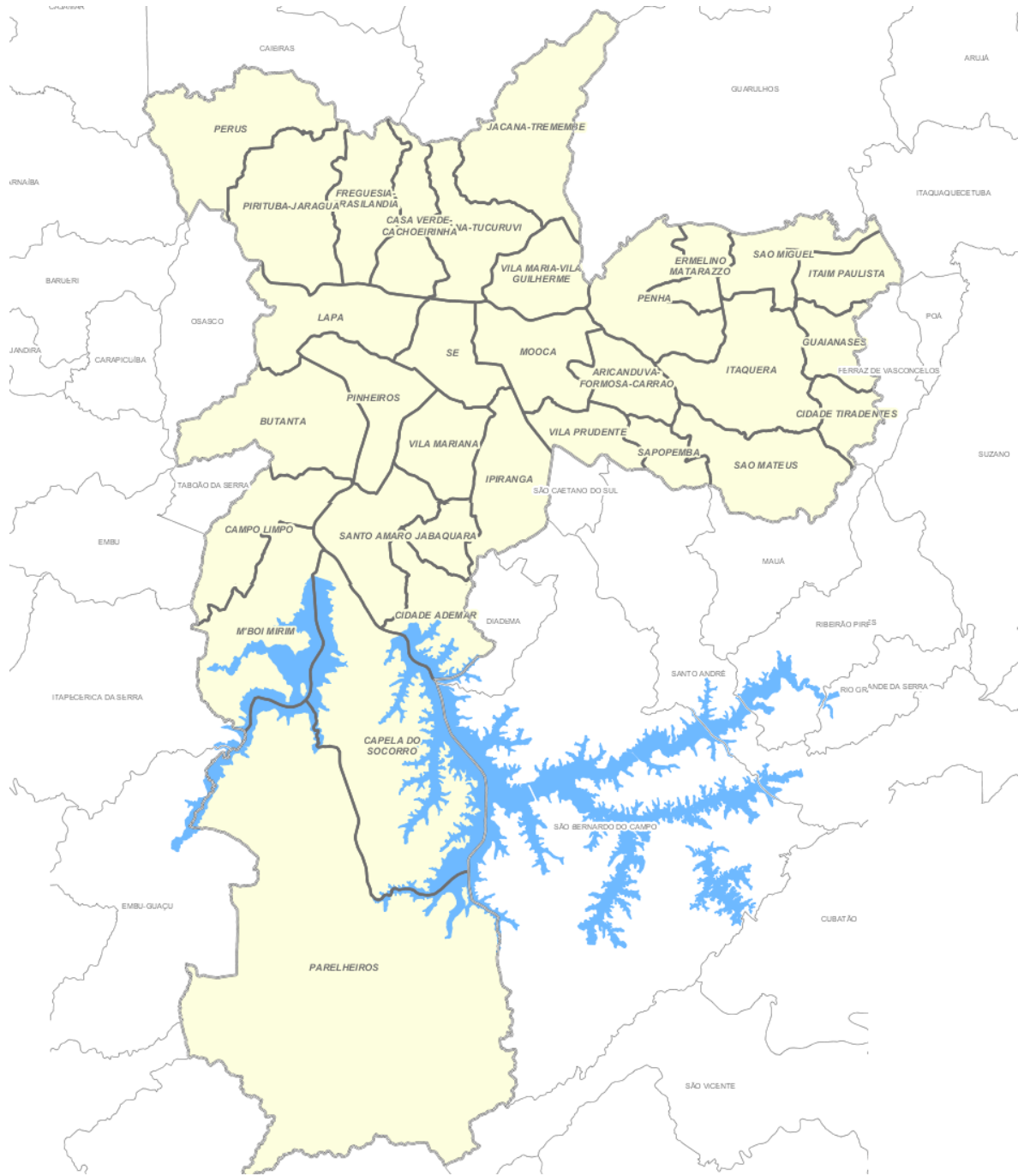
Source: Prefeitura de São Paulo (2018)

While it is true that the municipality of Sao Paulo is expanding, this growth is more notable in certain areas. For example, in the last two decades, there has been a population decrease in the central part of the city, which is not surprisingly one of the wealthiest regions. Since 1995, real estate companies have been investing in the creation of residential projects for medium and TOP classes in the central region. As a result, this has increased the value of the land and cost of living in these areas, causing the immigration of the BOP population to more affordable regions of the city (Torres, Alves, & de Oliveira, 2007).

Besides the high development of residential areas, the central region of Sao Paulo is also the business district of the city, this, increases the traffic of vehicles and affects directly the mobility and the living conditions. To reduce these problems the government created urban traffic restrictions to private and delivery vehicles in this part of the city, such as parking restrictions, loading/unloading zones, and delivery time windows. These restrictions intend to ameliorate the traffic inside of Sao Paulo, however, they also affect directly to the distributors of FMCG.

On the other hand, each year more people are moving to BOP neighborhoods, where land prices are cheaper, in some cases, it exists the option of even settling illegally. The growth rate of people moving to BOP neighborhoods is around 6.3% per year (da Gama Torres, Marques, Ferreira, & Bitar, 2005). According to the Instituto Brasileiro de Geografia e Estatística (IBGE, 2010), in the city of Sao Paulo, 66% of the population lives in slums or informal settlements, also slums occupy 53% of the city's land, this percentage is higher than any other city of Brazil.

Another characteristic of the BOP regions, especially slums is that they have a lack of public services and urban infrastructures (da Gama Torres et al., 2005), such as security, lighting, and the presence of the police, which hinders the distribution of FMCG goods. In addition, it exists a relation between poverty and accessibility; this is because poor settlements are located in areas with strong slopes and upward slopes. The streets that predominate in slums are alleys and narrow streets, more than half of the streets have these characteristics, followed by roads

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with 40%. The strong presence of narrow streets restricts the access of cargo trucks and the transit of vehicles. This is caused by the lack of space and the verticalization of the households located in slums, in Brazil, 72,6% of these households have no space between them (IBGE, 2010). The problems related to the deliveries in these regions of the municipality of Sao Paulo motivate this study, by comparing the perceptions of consumers, small retailers, and carriers that act in these areas.

1.3 Sao Paulo Municipality Restrictions

An important characteristic of Sao Paulo is the high use of automobiles to transport, the number of cars registered in the city increased 558% in 30 years, according to Detran-SP (2009), Sao Paulo had 1,604,135 vehicles registered in 1980, this number increased to 8,958,224 vehicles by 2019, as Table 1 shows. This has a big impact on the city causing problems such as traffic congestion, high emissions of CO_2, noise, and accidents. For this reason, the government created incentives and restrictions to reduce these problems.

Table 1- Cars per year in Sao Paulo

Number of vehicles per year in Sao Paulo	
1980	1.604.135
1991	3.614.769
2000	5.128.234
2001	5.318.888
2002	5.491.811
2003	5.649.318
2004	5.807.160
2010	6.954.750
2017	8,958,224

Source: Detran-SP 2017

The government of Sao Paulo in partnership with the Company of Traffic Engineering (CET-SP) have created a series of restrictions to measure the problems of traffic inside the city. These restrictions aim to reduce the traffic of vehicles in general such as Operation Pico, Restricted Structural Routes (VER), or Area of Maximum Circulation Restriction (ZMRC). In the following part are explained the restrictions for delivery vehicles.

Operation Pico time or Rodizio was implemented in 1997; the objective was to reduce the gas emissions produced by the cars. By the year 2008, the city of Sao Paulo also decided to apply a transit restriction to cargo trucks. This measure does not allow circulating vehicles in certain days of the week, depending on the last number of their license plate, as shown in Table 2. This restriction works only during rush hours, from Mondays to Fridays from 7:00 a.m. to 10:00 p.m. and 5:00 p.m. to 8:00 p.m., except holidays.

Table 2 - Last license plate number and restriction per day

Day of the week	Monday	Tuesday	Wednesday	Thursday	Friday
Last digits of the license plate	0 and 1	2 and 3	4 and 5	6 and 7	8 and 9

Source: CETSP 2019

It is important to say that the rodizio restriction only applies to the region known as the expanded center (centro expandido); this region surrounds the historical center of the city and is delimited by the mini-ring road (mini-anel viario). Figure 2 shows the delimitation of this area; which including the historical center has an area of 189, 60 Km². Furthermore, the majority of the population that lives in the historical center makes part of the middle-class, while the population who lives inside the expanded center makes part of the TOP population; especially in districts such as Alto de Pinheiros, Moema, Jardim Paulista, Itaim Bibi, Pinheiros, Perdizes e Vila Mariana (Massara, 2012).

Figure 2 - Mini-Ring Road

Source: CETSP 2019

ZMRC - Area of Maximum Circulation Restriction - the government of Sao Paulo defines it as "Area of the municipality of Sao Paulo that restricts the transit of trucks and that concentrates commercial and service zones". It restricts the transit of delivery vehicles inside the mini ring-road from Monday to Friday from 5 a.m. to 9 p.m. and Saturdays from 10 a.m. to 2 p.m., except holidays.

VER - Restricted Structural Routes - The government of the municipality of Sao Paulo has also restricted the transit of delivery trucks in specific roads, tunnels, viaducts, and high-traffic bridges. The restriction applies from Monday to Friday from 5 a.m. to 9 p.m. and Saturdays from 10 a.m. to 2 p.m. except for holidays. Only delivery trucks who are specially registered will be able to avoid this law and this varies depending on the type of vehicle and the type of load that transports.

Vehicles, trucks, and VUCs, whose activities or nature of transported products are label, as exceptions for the ZMRC and VER regulations. These vehicles must bear the Truck Card, which is a special permit for movement and parking obtained by registering at the Municipal Secretariat of Transportation (SMT). For example,

VUCs have specific times and days for circulation in these zones and restraint routes for activities such as garbage collection, transportation of perishable foods, and transportation of values. In addition, VUCs need to meet the following specifications: maximum height of 2.20 meters, the maximum length of 7.20 meters, and only vehicles created from 2015 onwards.

R-9 - Prohibited the transit of trucks - these areas are usually marked with the sign R-9 and the caption "only authorized vehicles from Monday to Friday from 5 a.m. to 9 p.m. and Saturdays from 10 a.m. to 2 p.m.".

ZERC - Special Truck Restriction Zones - the ZERC aims to restrict the transit of delivery trucks to residential areas. This improves the quality of life in residential areas and making the area a safer place to live for their residents. It is important to remark that this restriction also applies to VUCs.

Zona Azul - Is a parking area in which the user needs to pay a fee for using the spot for a certain amount of time. It exists two types of Zona Azul, the first one applies for private vehicles and the second one applies for delivery vehicles, in this case, the area works as a loading/unloading zone.

OHD - Off Hour Deliveries - the restriction allows vehicles to deliver goods between 10 P.M. and 6 A.M. Also, it is important to remark that recently the Companhia de Engenharia de Tráfego in collaboration with the Universidade de Sao Paulo (USP) is encouraging the carriers and shippers to adopt night deliveries (Cetsp, 2019).

Speed limit - This restriction depends on the type of street; the limits go from 70 km/h and 50 km/h for cars and 60 km/h to 50 km/h for trucks.

1.4 Justification

This study aims to ameliorate the distribution of goods in the municipality of Sao Paulo, by studying the perspectives of the stakeholders involved in the deliveries of FMCG. This research will bring new perspectives on the relationship between freight operators, urban policies, and consumer behavior in small retailers. As well as, identifying the main problems that affect the delivery of goods in high-income and low-income neighborhoods. Furthermore, this will facilitate the creation of more precise urban restrictions that adequate to the needs of both regions. Finally, this could help as an example for other megacities in developing countries where local policies focus on urban mobility and ignore the distribution of goods (Lindholm & Behrends, 2012).

It exists previous studies based on the collaboration of stakeholders involved in urban freight distribution such as Lindholm and Behrends (2012) who developed a multi-case study in cities around the Baltic sea, to analyze the perceptions of public and private stakeholders about the state of freight transport. The study included the evaluation of the transport system and the freight transport of 12 cities around the Baltic Seat. To attend this, in-depth reviews were applied to the cities of, Bremen, Gdynia, Kaunas, and Orebro. Results showed that traffic is a growing risk that affects the sustainability of urban regions; problems that local authorities and logistics transporters often ignore.

Lindholm (2013) made a review of the last 15 years about the perception of local authorities about urban freight transportation since authorities usually ignore the subject. The review is especially focused on measures took by governments to improve the urban freight. According to the studies reviewed, local authorities need to contemplate the areas of measure; transferability, and stakeholder involvement to make urban freight transport more structured.

Holguín-Veras et al. (2005) analyzed the point of view of private stakeholders (Receivers, Shippers, Carriers, 3PL, Trucking companies, and Warehouses) about off-peak deliveries in congested urban areas in New York City and New Jersey. The

evaluation of the stakeholders involved focus groups, in-depth interviews, and internet surveys. The results of the interviews showed that the participation of the receivers is crucial to develop successful off-peak deliveries initiatives, also tax incentives can motivate the receivers to participate in off-peak deliveries.

Then the authors Domínguez et al. (2012) studied the responses of receivers to the policies of nighttime deliveries and urban goods distribution centers in the cities of Barcelona and Santander. The results were compared to the study carried out in NYC and New Jersey by (Holguín-Veras et al. 2005) and then, two different freight models for each city. As a result, in the city of Santander receivers prefer to adopt urban distribution centers especially in the sectors of hotels, restaurants, and furniture stores. In the case of Barcelona, off pick deliveries is an important process for the food sector.

In the city of Rome Stathopoulos, Valeri, and Marcucci (2012) examined the reaction of stakeholders (receivers, carriers, forwarders, and policymakers) about the implementation of new freight policies. The authors applied in-depth focus groups to the stakeholders to identify the problems related to freight deliveries and their sensitivity to the new policies. The second survey focused on evaluate the reaction of the stakeholders to the policies identified as the most important by the groups, the results show acceptance to certain policies.

In the case of Brazil, only a few studies are related to stakeholders involved in urban freight distribution. For example, Vieira, Fransoo, and Carvalho (2015) interviewed shippers, logistic service providers, and carriers about the problems and regulations involved in the distribution of goods in the Sao Paulo Metropolitan Region. The authors developed a literature review to define the regulations and issues that companies face when they make a delivery. These issues were then classified into five groups (regulatory, logistical, collaboration, environmental, and risk). Then these attributes were transformed into logistical performance indicators to compare the efficiency of the actors in the SMPR. Finally, the results indicate that the carriers perform better than other actors do. Additionally, all the stakeholders

identified traffic congestions and lack of security as the main problems of the deliveries.

Besides, Vieira and Fransoo (2015) studied the perception of 3PLs and carriers in the SPMR to understand freight distribution inside the city. The study takes into account urban regulations and the collaboration as a whole; also defines the main logistical performance constructs between the stakeholders. To achieve this, a survey was applied to the stakeholders, the results showed that collaboration and regulations are the weakest constructs of freight distribution, which usually affect the logistical performance.

Finally, Vieira, Carvalho, and Yoshizaki, (2016) identified the main attributes that hinder the distribution of goods in the SPMR by interviewing carriers and logistics operators. The researchers divided the attributes into five groups, logistical, collaboration, regulatory, environmental, and risks. For this study, the researchers developed a literature review and a case study to identify attributes that hinder the distribution. With a base on the preview information, the researches created a questionnaire, which was applied to the logistic operators In the SPMR. The results showed that the interviewees consider transit restrictions; traffic and cargo robberies as the main attributes that hinder the distribution.

It is important to remark that none of the studies mentioned above has considered the consumer behavior of the clients or made a comparison of BOP and TOP neighborhoods in developing countries. Thus, this study is important and brings a new perspective from stakeholders who were not considered in previous studies about urban freight distribution. Especially, to understand the distribution to small retailers in BOP neighborhoods.

1.5 Objectives

The objective is to study the urban logistics, by comparing the Base of the pyramid and Top of the pyramid districts in São Paulo city, by taking into account the consumer behavior, local business and the perception of the carriers. This study investigates two districts: Vila Mariana located in the South-Central region of Sao Paulo, which makes part of the TOP, and on the other hand, Itaquera, which represents the BOP and is located in the East region of Sao Paulo.

This research aims to respond to the following questions, which are focused on the three actors (consumers, small retailers, and carriers):

What are the buying habits of BOP and TOP consumers when they buy in a local store?

What are the characteristics of the reception of FMCG goods in both districts?

What are the main problems that hinder carriers for delivering goods to the district of Itaquera?

This will be achieved by exploring the perception of consumers, small retailers in both regions, and carriers in Itaquera; the research has three specific objectives:

1. **Identify the buying habits of BOP and TOP costumers in small retailers.**

Hypothesis 1. (H1a) Consumers from both regions mostly buy their products from supermarkets and hypermarkets.

Hypothesis 1. (H1b) For consumers at the TOP is more important to pay with a credit/debit card, than for the consumers at the BOP who pay with cash.

Hypothesis 1. (H1c) TOP consumers prefer attending small retailers during the week while BOP prefers attending small retailers during the weekend.

Previous studies have proven that consumers behave differently in TOP and BOP regions (Barki & Parente, 2014). Consumers tend to consider different factors for choosing a store, these factors are Brand loyalty (Kumar et al. 2016), Price (Jaisawl & Gupta 2015,) (Chikweche, Stanton, & Fletcher, 2012), Relationship with the retailer (D'Andrea, Lopez-Aleman, & Stengel, 2006).

While it is true that small retailers are popular in the developing world, countries such as China and Brazil have proven to be more receptive to modern retailing, these retailers possess around 60% of the countries' market share (Fransoo & Blanco, 2012). In addition, for the BOP population, shopping in supermarkets creates a feeling of social inclusion and the impression that the products sold in supermarkets have a better quality (Barki & Parente, 2014; Amine & Lazzaoui, 2011).

Another interesting fact that differentiates the BOP and TOP consumers are the payment methods. On one hand, most of the BOP consumers do not possess a bank account (Karnani, 2009; Banerjee & Duflo, 2006) this fits with the operation method of small retailers in BOP regions which mostly operate with cash (Boulaksil & van Wijk, 2018). On the other hand, TOP consumers tend to buy more from modern retailers, which usually have diverse paying methods (Amine & Lazzaoui, 2011).

2. Identify the main characteristics of receiving FMCG in both districts.

Hypothesis 2. (H2) Small retailers in TOP neighborhoods mostly receive their products from FMCG drivers while small retailers at the BOP use their vehicles to obtain FMCG products.

In the literature, the distribution of products for retailers is divided into formal and informal (Zhang, Tang, & Zhou, 2017). In the formal distribution, the retailer receives the products of a company. Formal distribution has multiple techniques of replenishment, such as Direct, Crossdock (XD), Urban Consolidation Centers (UCC), Hub-and-spoke (Kin, Spoor, Verlinde, Macharis, & Van Woensel, 2018),

Presales, On-board sales, Distributors, Pre-Sales with distributors (Fransoo & Blanco, 2012), (Boulaksil & Belkora, 2017). This type of distribution is popular among TOP regions where modern retailing has a stronger presence.

On the other hand, informal distribution is the procedure where the retailer travels to replenish their stock from a company or a wholesaler (Zhang et al., 2017). This type of distribution is more popular among BOP regions, especially between small retailers, mainly because international companies prefer safety while they develop their business since attending new markets requires an investment of time and money (Fransoo & Blanco, 2012, p28.). It is important to remark that small retailers do also receive products via formal distribution, this happens most of the time when a big international company is delivering its products to these regions (Fransoo & Blanco, 2012).

3. **Identify the main factors that hinder companies from delivering products to BOP neighborhoods.**

Hypothesis 3. (H3) Carriers considered that the lack of infrastructure in the district of Itaquera is the major problem that hinders the deliveries.

The literature demonstrates that effective urban logistical operations depend on different factors (Dias, Yoshizaki, Favero, & Vieira, 2019). Most of these factors make part of the infrastructural services of a city, which varies depending on the region. These factors are electricity, drinking water (Karnani, 2009)(GLOBAL URBAN OBSERVATORY, 2003), (da Gama Torres et al., 2005), (IBGE, 2010) sewage (Banerjee & Duflo, 2006)(GLOBAL URBAN OBSERVATORY, 2003), streets, public lighting (IBGE, 2010), (Dias et al., 2019), (da Gama Torres et al., 2005) and risk related to floods or delivery security (Vieira et al., 2015).

On the other hand, deliveries are also hindered by urban restrictions (Vieira et al., 2015). These restrictions seem more strict in city centers where governments try to preserve the historic regions (Dablanc, Diziain, & Levifve, 2011). In the literature was found that the most used restrictions are: time windows (Dablanc, 2007), loading/unloading zones (Muñuzuri et al., 2017), load factors (Arvidsson,

2013), off-hour deliveries (Holguín-Veras et al., 2018), speed limit, license-plate-based car rotation scheme (Swiatek et al., 2014), (Vieira et al., 2015).

Also, Vieira et al.,(2015) identified other problems that do not make part of the infrastructure or urban restrictions, but they affect the distribution. These problems are lack of technology used by the carriers; accumulation of deliveries during the last week of each month; long queues for loading and unloading merchandise; and lack of collaboration between stakeholders.

1.6 Scope

This master's thesis has as scope on the urban distribution of FMCG, limited to the attributes, roles, and perceptions of the consumers, small retailers, and carriers in the districts of Itaquera and Vila Mariana. The investigation concerns the consolidation, consumer behavior, payment methods, infrastructure, and services in these districts.

This study aims to focus on the problems related to the municipality of Sao Paulo. This is accomplished by using only data related to the municipality of Sao Paulo that could contribute to the development of this research. It is important to remark that the particularities of the city regarding the traffic of vehicles, such as transit restrictions, use of loading/unloading zones and restrictions to reduce the pollution levels of the city are an important point of study for this research.

Besides, the perceptions between the stakeholders involved in this study will be taken into account, and if necessary the roles of other agents involved in the delivery of FMCG such as enterprises, communities, and local authorities.

2. LITERATURE REVIEW

2.1. Small retailers

In the developing world, small retailers are popular retail stores. Fransoo and Blanco, (2012) estimated that around 50 million of these stores exist among the developing countries, in many of these countries small retailers own around 50% of the total retail market. These retailers can be defined as small stores that sell daily life products, they are independent, family-owned, operate with small capital (Youssef Boulaksil & Belkora, 2017), and serve around 100 and 200 costumers (Fransoo & Blanco, 2012). Small retailers have a high level of popularity, even if their prices are higher than prices at supermarkets, since small retailers adequate to the needs of their clients. For example, they sell in small quantities; offer informal credits to their best clients (D'Andrea, Ring, Aleman, & Stengel, 2006); and is an option for shopping close to your neighborhood; this is especially important among BOP population which does not always own a car (Talukdar, 2008).

The owners of small retailers are characterized for usually make part of the BOP, they usually have a low level of education (Y Boulaksil, Fransoo, Blanco, & Koubida, 2014) and no previous knowledge about business administration. The operation methods that they use to manage their stores are basic; most of the time by just using a notebook and a mobile phone (Fransoo & Blanco, 2012).

Deliveries to small retailers are restricted by the small storage capacity of the store and the little amount of cash that owners use to operate (Y. Boulaksil & van Wijk, 2018) making their operations inefficient (Lo et al, 2001). Furthermore, for multinational companies, it is important to reach small retailers since this is an effective technique for giving visibility to their products. Once a company succeeds in delivering its merchandise the probability for the competition to distribute to the same store is low, due to the small space that small retailers have to show the products they sell (Fransoo & Blanco, 2012).

Thru the years, several authors studied small retailers, in the academic literature, small retailers are found with different names, such as traditional retailers,

mom-and-pop stores, and nanostores. The studies included in this section are the base used in this research for defining a small retailer. This literature review also helps to understand the small retailers' operation mode, and most importantly, is the base to develop the questionnaires for the stakeholders involved. The next paragraphs show the main studies founded on small retailers as well as a summary of these studies in Table 3.

The definition of small retailers differs between authors. The first academic article focused on small retailers was created by Doody and Davidson (1964)) the authors defined the problems that large retailers face; the diversity of the consumer market; and quasi-integration; which are factors that small retailers can use as an advantage to succeed in the market. In addition, the authors defined a small retailer as one or more stores that are owned and operated by an individual or individuals and whose operations involve continuously personal involvement.

After this, several studies based in small retailers were made, such as MacDonald and Nelson, (1991) who compared prices between low-income and high-income neighborhoods. By analyzing the fixed market basket of goods in ten cities in the U.S., the sample included 322 stores including supermarkets and independent stores. The results demonstrated that prices in central city stores are 4% higher than suburban areas, it is important to remark that the central areas of the cities in the U.S. concentrate their BOP population.

Later, D'Andrea, Lopez-Aleman, et al., (2006) studied for the first-time small retailers in six Latin American countries. The methodology used was applying the technique of focus group, by interviewing four groups of people in each country. The authors identified that these stores tend to have a wide range of formats in Latin-American. For this study, the small retailers selected were the ones found in all the countries, which measured between 25 and 50 m² and operate as a small-self-service store. The results showed that small retailers succeed in Latin-American countries because they fit the needs of their consumers; their business model is sustainable, and the informality of the businesses plays an important role.

Then Lenartowics and Balasubramanian, (2009) presented a study analyzing the practices of small retailers in the SPMR, to explain to big companies the success of these retailers in developing countries. The study includes a macro-perspective of small retailers based in a literature review, and a micro-perspective of small retailers in the SPMR; based in an interview applied to 51 small retailers in the SPMR. The authors found six macro perspective characteristics of small retailers: agglomeration, periodic markets, ethnic domination in small retailing, social role, the dependence between channel members, and structure channels. In agglomeration, small retailers tend to cluster by type, this facilitates the search for consumers, and the small retailers can build a reputation and strong relations with the consumers and save money in advertising. Periodic markets consist of small retailers rotating between markets. In some cases, ethnic groups own a small retailer market; this is the result of one ethnic group controlling the whole supply chain of a product. The base of the social role is the trusting relationship built between the small retailer and its customers, these retailers have dual nature commercial and social. Dependence between channel members is an important strategy for multinationals to use, this can improve their relationship with small retailers and increase the sales and presence of their product. The structure of channels for small retailers is based on an economy of scale, which is used to distribute products. In this type of distribution, multinationals do not necessarily have an advantage over small-scale manufacturers, who can deliver products faster to small retailers but at the same time reach fewer stores.

Findings showed that small retailers ordering system is based in terms of their last week sales; visits from the salesperson to the small retailer last less than eight minutes and the small retailer owner have a strong influence in the ordering decision. Besides, managers will be less effective if they adopt a single interaction style across this type of retailer. Decision-making heuristics could help in reducing costs for small retailers, but at the same time can give an advantage for companies over these retailers. Credit has a limited role in the small retailing market. However, this study did not consider the influence that the infrastructure of a city has over the decisions that a small retailer takes for the delivery of products.

Sinha et al., (2017) studied the factors that BOP retailers consider when adopting a brand. The authors interviewed 60 retailers; by using in-depth and unstructured interviews, the responses were recorded, then transcribed and analyzed. The type of small retailers analyzed in this study are Kiranas, which are very popular in India, the stores characterize for measure less than 500ft, stock about 5,000 items, offer credits and are open all week. The factors studied are divided into four categories, brand-related, business deal, relationship, and product. Finally, the results showed that it exists six criteria that retailers considered more important: demand for the brand, brand adoption by other retailers, profitability, the influence of wholesaler, and packaging. However, this study took place in India; where social structure is different from Latin-American countries, thus some answers do not represent the point of view of small retailers in other countries.

Fransoo and Blanco, (2012) defined small retailers as a family-operated business, the size of these stores is diverse, some of them could be mini-stores sizing between 15-40 square meters. The authors then introduced the term nanostore for small retailers that measure less than 15 square meters. These stores supply between 100 and 200 consumers, give informal credits, and have a limited assortment due to the small size of these stores. The authors study the characteristics of these nanostores in developing countries in Asia, Latin-American, and Africa, as well as the delivery techniques that companies use to reach these stores.

Finally, Dholakia, Dholakia, and Chattopadhyay, (2018) studied the consumer behavior of Kiranas in India. The authors defined these establishments as family-owned and operated; sell FMCG at a maximum retail price; measure around 500 square feet; stock is restricted by the size of the store, and the dominant format is counter service stores. The research took place in two Tier I cities Mumbai and Kolkota, and two Tier-II cities Aligarh and Visakhapatnam. The method used was observation and shopper interviews. The authors interviewed 264 shoppers, observed 287 clients, and accompanied eight clients during the shopping. Findings showed that the likely shopper is male, trips to these stores were daily, each trip

made was to purchase few items (less than three), home delivery takes place when the shopper buys a larger quantity of products, and shopkeepers have a big influence over the customers offering new products. Finally, the preference of shopping informal stores differs from the geographic location; Mumbai and Visakhaptnam have a better acceptance for formal retailing than the other two cities.

Table 3 - Previous studies on Small retailers

Author	Country	Research method	Findings
D'Andrea, Lopez-Aleman, et al., (2006)	Argentina, Brazil, Costa Rica, Mexico, Chile, and Colombia	Interview with small retailers, 4 focus groups in each country.	Small retailers fit the needs of their consumers, their business is sustainable, the informality of the businesses plays an important role.
Lenartowics and Balasubramanian, (2009)	Brazil	Survey to small retailers in the SPMR. To understand how small retailer owners take decisions.	Credit may have a limited role in the market. Salespeople will be less effective if they adopt a uniform interaction across retailers.
Fransoo and Blanco, (2012)	Developing countries	Defined Nanostores and analyzed the distribution methods that companies use to supply these retailers in Latin America, Asia, and Africa.	Nanostores are family-operated businesses; their size varies between 15-40 square meters.
Sinha et al., (2017)	India	Survey to analyze how small retailer owners decide to adopt brands.	Small retailer owners consider the demand for a brand, profitability, packaging, and influence of the wholesaler business as the most important factors to choose a brand.
Dholakia et al., (2018)	India	Interviews and observations to identify the advantages of buying in small retailers	The advantages of buying in a small retailer are store location, home delivery, and relation with the storekeeper.

It is important to remark that scientific authors made the first studies of small retailers in developed countries such as the United States. Due to different factors, such as the wealth of the population or accessibility to cars, super and hypermarkets gained popularity in developed countries making the small retailers less popular. In recent times, most of the studies related to small retailers are made in developing countries such as Mexico, India, and China. The reason why is due to the later introduction of formal retailing in developing countries; the low purchasing power of the people; and traditional retailers still fulfill the needs of their clients (D'Andrea, Lopez-Aleman, et al., 2006).

2.2 Last-Mile Delivery to Small Retailers
2.2.1 Last-mile distribution

Supplying small retailers in urban areas is not an easy task, the high number of stakeholders involved make the delivery process more complex (Stathopoulos et al., 2012). In addition, inefficiency is common in this type of deliveries, since freight vehicles in charge of the distribution to small retailers often make deliveries with a low vehicle fill rate (Kin, Ambra, Verlinde, & Macharis, 2018). This is caused by small retailers being short of cash, which limits the number of goods they receive from companies and wholesalers (Boulaksil & van Wijk, 2018). Also, it is well known that small retailers offer credits to their best clients; this process leaves the owners short of cash for paying the products that companies offer (Fransoo & Blanco, 2012). This problem affects directly to the supply chain since companies and distributors do not offer credits to small retailer owners, disrupting the deliveries and turning the distribution into an inefficient process (Boulaksil & Belkora, 2017).

Only a few pieces of research focused on last-mile deliveries to small retailers are found in the academic literature. For example Kin, Spoor, Verlinde, Macharis, and Van Woensel, (2018) developed a study in Brussels using the spare transportation capacity of vans of a service-driven company for delivering goods to small retailers. Four delivery models were considered Direct, Crossdock (XD), Urban

Consolidation Centers (UCC), and finally, UCC mixed with XD. In the direct delivery strategy, the FMCG Company delivers its products to a distributor, then a sales employee of the distributor visits and collects the orders from the small retailers. The sales employee then makes the order and a van makes the delivery. This delivery method aims to reduce the uncertainty of delivering products and improves planning. In the second method, the product goes from the delivery company to a Crossdock deck, where the FMCG are trans-shipped to smaller vehicles, the aim of this is methodology is to increase the vehicle fill rate. UCC consists of sharing this facility and the transport vehicles with other distributors, this aims to increase the volume per vehicle and decrease the cost per item. Finally, UCC mixed with XD, the products passed first for the UCC, and then for the XD, this multi-echelon of three tiers aims to decrease distances to stores. The results show that Direct delivery is more effective for short distances and high drop sizes. Cross-docking is more feasible for long distances. UCC is more adequate for low drop sizes, also when governments implement more restrictions. However, the study does not consider the local restrictions for loading/unloading and appropriate place to receive the goods. These characteristics hamper deliveries to small retailers.

Parkhurst, Ricci, Fadda, Paddeu, and Fancello, (2018) evaluated the perceptions of retailers and small and medium-sized independent enterprises about the use of urban consolidation centers (UCC) in the cities of Bristol which possess a UCC and the city of Cagliari who does not possess a UCC. The survey aimed to understand the benefits of using a UCC and their main drivers on the side of Bristol, and on the side of Cagliari, the survey investigated the limitations to potential implementations of collaborative sharing logistics. The results showed that retailers in Bristol are satisfied with the use of the UCC, which identified the following drivers, not needing a big stock room, avoiding inefficient last-mile deliveries, and protection of the environment. On the other side due to the nature of the retailers in Cagliari, most of them received perishable goods, which results in high frequency and small size orders. Finally, the major barriers identified were the cost and the economic sustainability of the UCC, the type of goods delivered, and competitiveness between companies, which can hinder the share deliveries of the UCC.

Boulaksil and Belkora, (2017) made a study based on two common distribution strategies for delivering goods to small retailers in Casablanca, the first one is called van sales and the second one pre-sales. To increase their sales, small retailer owners offer credits to their clients despite their small capital. As a result, owners tend to run out of money for paying to the suppliers who only accept cash; as a result, the efficiency of the deliveries is affected. The authors analyzed the number of stores visited; time spent at the store, hit rate, and cost per bill, of both methodologies, to discover which of them has a better performance. The results showed that presale outperforms van sales, even though it requires more workers. The study also did not take into account the lack of security during deliveries

Butrina et al., (2017) proposed a study focused on the last 800 ft. of the delivery, instead of the last-mile, for the authors, this is the maximum distance that should exist between a parked delivery truck and the store that will receive the goods. The study analyses each step involved in the delivery at 800 ft., the results indicated that finding a place to park takes a lot of time, a parked delivery truck can cause traffic and the costumers are always expecting more reliability. However, it is also important to consider the morphology of the city when we apply this research.

Aman and Hopkinson (2010) studied the impact that international FMCG wholesalers have in the distribution channels in Pakistan. The study aims to know the perception of the stakeholders in the delivery of FMCG before and after the introduction of international FMCG wholesalers. The results showed that the introduction of international wholesalers changed the structure of the distribution channels in Pakistan. Distribution companies feel more threatened about the international wholesalers since wholesalers can distribute goods to all the retailers and at the same time sell goods to the final consumers. This article presents a detailed explanation of the distribution channels post and after the introduction of international wholesalers in a developing country; however, it did not take into account the urban logistics of this process.

Fransoo and Blanco (2012) proposed five models used in developing countries to supply small retailers (presales, on-board sales, distributors, pre-sales with distributors, and wholesalers). Presales are when a member of the FMCG company visits the small retailer periodically to collect the orders; once the orders are made the small retailer will receive and pay for their products the day after. The on-board sale is a model where vans full of goods from the company visit the small retailer periodically to sell the FMCG. Distributors are independent businesses that sell and deliver goods from one or multiple brands to the small retailer. Pre-sales with the distributor; is a collaboration between a company that collects the orders and a distributor who delivers the FMCG. Wholesalers are also independent businesses and, in this model, small retailers owners pick-up their goods at these stores.

Sodhi and Tang (2014) analyzed the opportunities of a hub-and-spoke distribution model where companies hire people as local last-mile distributors. Companies use this methodology for reaching small villages and congested areas in developing countries. In the hub-and-spoke strategy, a company set up a distribution center, which is going to work as a "hub", and then the local distributors will pick up the goods from the hub and sell the goods in more remote areas "spokes". However, this strategy has a major problem, which is managing the inventory; local distributors need to go to the hub to replenish their stock, this can be an expensive process, especially if they need to do this frequently. Besides, this strategy requires a big investment, making this technique more suitable for big companies who want to reach remote areas.

The study of Zhang et al., (2017) compared three distribution strategies, "Informal" where each retailer search its goods at a wholesaler, "Formal" where one small retailer works exclusively as a wholesaler for other small retailers in its neighborhoods, and finally "Hybrid" where one small retailer will work as a wholesaler and retailer at the same time in its neighborhood. The results showed that the "Hybrid" strategy is adequate when travel costs are high. When travel costs

are medium, the formal strategy is the best option. Finally, when travel cost is low the most viable solution is to use informal strategy.

Each of these models has its advantages and disadvantages when it comes to cost, complexity, reaching time, and product positioning. It exists multiple factors that need to be considered by a company that wants to deliver their products to small retailers; like choosing the right delivery model that adequate to the size of its company; reaching consumer objectives; delivery time; economic resources; and sales objectives.

For example, according to Fransoo and Blanco, (2012), a leading company with a strong presence in a country would prefer presales, direct store delivery, and on-board sales. On the one hand, the logistic costs of these models are the most expensive, but on the other hand, they guarantee more control of the functions and closer contact with the small retailers' owners.

Multinational manufacturer companies prefer distributors, which means lower investment and more safety for their businesses. Local companies rely on distributors as well, these companies tend to change to direct distribution only when their company grows and has a stronger relationship with their customers. Thus, companies need to consider all these factors to choose the most convenient delivery model for their businesses. Table 4 shows the previous studies regarding last-mile deliveries to small retailers.

Table 4- Previous studies of Last-mile delivery to small retailers

Author	Country	Research method	Findings
Aman and Hopkinson, (2010)	Pakistan	Semi-structured interviews with manufacturers, distributors, wholesalers, and retailers about the introduction of international wholesalers to the market.	The introduction of international wholesalers poses a problem to the retail players in the traditional distribution channel.
Fransoo and Blanco, (2012)	Developing countries	Proposed five different models for supplying small retailers	Companies who want to deliver products to small retailers need to choose wisely the delivery model they want to use. Size of the company and reaching level are important factors to consider.
Sodhi and Tang, (2014)	Developing countries	Mathematical models to evaluate the use of a hub-and-spoke distribution model.	Viability of using members of a community as local distributors of products in small villages
Kin, Ambra, et al., (2018)	Belgium	Analyze the possibility of using spare transportation capacity of a service-driven company to supply small retailers.	Only a limited number of store orders can be delivered in the vehicles without increasing the kilometers traveled of the vehicle. Besides, kilometers are reduced when the DC is located close to the costumers and the stores.
Kin, Spoor, et al., (2018)		A mathematical model to simulate four different set-ups of a city with different city and store parameters.	When drop sizes are low and distances are long it is more adequate to use urban consolidation centers (UCC) and when drop sizes are low and distances are short it is more appropriate to use small vehicles to deliver the products
Butrina et al., (2017)	U.S.A	The study focused on the last 800 ft. of an urban delivery by analyzing each step involved in the process.	Finding a place to park takes a lot of time. Parked delivery trucks can cause traffic and the costumers are always expecting more reliability

Boulaksil and Belkora, (2017)	Morocco	Compared to the performance of van sales and presales distribution strategies. The parameters used for the analysis are the number of stores visited; time spent at the store; hit rate and cost per-bill.	The results showed that presale outperforms van sales, even though it requires more workers.
Fancello, Paddeu, and Fadda, (2017)	England and Italy	Comparison of the perspectives about the use of UCC to deliver products in Bristol and Cagliari.	Stakeholders can benefit from the use of UCC but the different needs and objectives of each stakeholder can hinder the collaboration. In Bristol, the major problems identified were sustainability, organization, cost allocation, and propensity to change. For the stakeholders in Cagliari, the type of goods to be delivered is the major barrier
Zhang et al., (2017)	Developing countries	Comparison of three replenishment strategies, formal, informal, and hybrid.	A hybrid model is adequate when the travel cost is high. The formal strategy is adequate when travel cost is medium. Informal model is adequate when travel cost is low.

2.2.2 Restrictions of the Last-mile distribution

The distribution of goods nowadays is a common process that takes place in every city around the world. Each year these cities are getting bigger and more complex, and to provide their inhabitants with FMCG products, governments need to improve constantly the infrastructures of their cities. Also, the distribution process requires space to consolidate the deliveries, such as facilities to store the goods inside and outside the city, conditioning and packaging areas, and loading/unloading zones (Dablanc, 2007). Moreover, this process contributes to negative impacts that reduce the human quality of life in the cities, such as air pollution; noise pollution;

climate change; accidents, and traffic (Ranieri & Digiesi, 2018). Governments are aware of the negative impacts that transportation brings to the cities and more importantly to human quality of life. Hence, regulations have been created to improve the flow of vehicles inside the cities; the problem is that these regulations were made without considering the point of view of the companies and carriers involved in the deliveries of goods (Vieira & Fransoo, 2015).

Even though urban freight vehicles only represent about 10-15% of the urban traffic flow, their negative impact is higher than the rest of the vehicles that transit through urban areas (Muñuzuri, Cortés, Guadix, & Onieva, 2012). This is why the creation of restrictions and incentives especially made for freight vehicles gained popularity. The most common restrictions are focused on local freight distribution networks, access restrictions, consolidation of deliveries (Arvidsson, 2013) time windows (Dablanc, 2007), and loading zones (Muñuzuri et al., 2017). Most of these incentives and restrictions are created locally, which sometimes makes them obsolete hence governments keep planning urban freight as they did 20 years ago (Dablanc, 2007). As a result, the delivery process becomes more complex and expensive. The creation of effective incentives and restrictions is an important task for governments, companies, carriers, retailers, and consumers. Besides, restrictions should consider all factors involved in urban freight, like mobility and land use, hence this will bring benefits in decreasing the levels of pollution, improve the traffic flow and even reduce the cost of the products to the final consumer. To achieve this; it is necessary a total understanding of how distribution to small retailers is made, the diverse distribution models available in developing countries, and their advantages and disadvantages.

2.3 The Base of the Pyramid

In the world, 4 billion people are living with less than $2 a day (Prahalad, 2005). This group of people makes part of the Base of the Pyramid (Bottom of the pyramid or BOP). According to Karnani, (2009), the BOP population is characterized by being illiterate, having low purchasing power as well as suffering from cultural and social deprivations. Also, the expansion of megacities in developing countries makes the BOP population a very vast group; it includes different ethnicities, languages, cultural costumes, geographical regions, and social norms (Beninger & Robson, 2015) that can reflect in different attitudes towards buying products. For instance, basic goods will not be the same for Mexico or Colombia. These characteristics make the BOP population different from the rest of the other social classes (Middle and Top of the pyramid), causing a lack of visibility from companies, even though corporations can make a big profit from offering products to the poor (Jaiswal & Gupta, 2011). Marketing to BOP costumers can provide growth opportunities to the private sector (Prahalad, 2005), considering a $5 trillion aggregate purchasing power that poor people have (Hammond et al., 2013). The study of this market can bring benefits for companies, governments, and the BOP population, especially in developing countries. The next paragraphs explain the four main characteristics of BOP neighborhoods; this information is based on previous studies.

2.3.1 Services and Infrastructure at the Base of the Pyramid

- *Education and health at the BOP*

Being part of the base of the pyramid in developing countries is often related to having low quality in education, especially at public schools, this is due to a lack of organization and infrastructure. For example, there are high rates of absentees from teachers (Karnani, 2009), strikes are common, educational budget from the government is low, facilities and school materials are old or in bad shape. In addition, parents at the BOP are illiterate or have a low level of education, causing low expectations in terms of quality education for their children (Banerjee & Duflo, 2006).

In countries like India, it exists the option of private education at the BOP, but even though absenteeism is rare, the qualification of the teachers to give classes is lower in the sense of having a formal teaching degree. Besides, attempting a higher level of education is difficult due to the short amount of money these families earn. Sometimes family members must start working at an early age.

As well as education, the quality of health services is lower at the BOP, for example in India most villages have a health sub-center for every 10,000 people, however, the services tend to be unsatisfactory with high levels of absenteeism from the workers in poor areas (Banerjee & Duflo, 2006). Besides, health workers in TOP neighborhoods tend to possess a higher level of education, such as Master Degrees and specializations while health workers in BOP neighborhoods do not these types of degrees (Das & Hammer, 2004).

- *BOP population are isolated*

BOP population lives in zones that have a lower level of urban planning and infrastructure than the Middle and TOP neighborhoods. The lack of formality in the infrastructure is the result of people occupying land without the permission of the government, and therefore, urban restrictions do not apply to these zones. For example, in the case of Rio de Janeiro, mass immigration of people from poorer states of Brazil occurred in the 1930s. Without the possibility of buying or renting a household, Immigrants opted to illegally settle on the hills (morros) of the city, where they constructed their households and made communities (Santa María, 2011). This means that access to these neighborhoods can be difficult due to the poor quality of the roads and the lack of proper public transportation to get there. Also, residents can suffer from a poor service of electricity and limited access to clean water (Karnani, 2009). Security can be another way of isolation, the presence of drug traffickers and gangs harm the unity of the communities (Perlman, 2006). The lack of help from governments makes the isolation of the BOP communities even higher, increasing the price of services and daily life goods.

- *Governments and companies have no interest in improving the services at the BOP*

For governments, all kind of precarious settlements represents the invisible part of a city (GLOBAL URBAN OBSERVATORY, 2003) besides problems at BOP neighborhoods such as municipal corruption, land conflicts and distrust of authorities make the implementation of services more expensive. Also, governments do not provide BOP neighborhoods with social and physical infrastructure. By not doing these, governments sent a clear message in which they do not recognize the illegal appropriation of the land by the BOP population. Besides, whenever governments decide to help BOP neighborhoods is because they will benefit from this action. For example, governments could benefit from the conversion of a BOP neighborhood into medium or TOP neighborhoods, especially from the neighborhoods located in centric parts of a city. For this reason, it is common that the residents of BOP neighborhoods avoid direct help from governments, instead of this they create their solutions, such as informally negotiating with local governments or organizations to access to basic services (Dekel, Meir, & Alfasi, 2019).

In the case of international companies, the approach with the BOP population is different; they tend to have a deeper knowledge about middle and TOP consumers. This approach is clear in its publicity campaigns and the distribution of its products. On the other hand, for the BOP consumer, the lack of access to international brands has a big influence on how they consume (Beninger & Robson, 2015) as a result their shopping behavior is more influenced towards visiting local stores and consuming local products (Parente, Barki, & Geargeoura, 2018).

- *BOP population and banks*

Governments and companies believe that BOP consumers do not have a strong purchasing power. While it is true that the amount of money that a person at the BOP makes per year is low, their buying power as a whole community is substantially high (Prahalad & Hammond, 2002). The low purchasing power belief has a relation with the lack of conscience about saving money and not owning a bank account. For the BOP population opening a bank account can be seeing as a difficult process or they consider that save money is something that only rich people do. Also, not owning a bank account can make more difficult to cut unnecessary expenses, since they feel tempted to spend their money (Karnani, 2009). Another current practice at the BOP for saving money is to keep it in their household, but there is a risk that the money can be stolen, or taken by another member of the family (Banerjee & Duflo, 2006).

2.3.2 The Base of the Pyramid Consumer Behavior

BOP denotes the low-income market and consumers in developing countries (Nakata & Weidner, 2012). In this section, we identified five main characteristics related to BOP consumer behavior found in academic papers.

- *People at the BOP are paid daily*

There are certain characteristics related to the BOP population and the types of jobs they perform, for example, to cover their expenses people at the BOP have multiple jobs that require little specialization (Banerjee & Duflo, 2006). Also, there is a belief that it exists a lot of entrepreneurship a the BOP (Prahalad, 2005). This is due to the type of businesses that exist in these communities. For example, owning a small retailer, selling food on the street, or recycling are common businesses, surprisingly these jobs are disappearing in developed countries. On the other hand, Karnani, (2009) considers that label the BOP population as entrepreneurs only harms them, according to the author governments should reduce the microcredits to

the poor and focus more on creating new jobs by hosting multinational companies. The little amount of money that they earn daily is the result of owning a micro-business or having jobs that require little specialization. Consequently, this makes the consumer behavior at the BOP different in comparison to the upper classes. For the BOP shopping, FMCG happens daily, it exists a preference in shopping in small quantities or single-serve packaging products due to the lack of money for buying bigger quantities (Prahalad, 2005).

- *BOP population pay more for their daily goods*

It is well known that BOP consumers pay more for their products in small retailers than in retail chains (Roger & Klevorick, 1971). According to Talukdar, (2008) they pay between 10 and 15 percent more for everyday groceries. For Prahalad and Hammond, (2002) this percentage is higher, between 20 and 30 percent, this is considered a poverty penalty caused by local monopolies, inadequate access, poor distribution, and strong traditional intermediaries (Prahalad, 2005). Besides, a vast population of the BOP lives in remote areas and do not own a car (Talukdar, 2008). This hinders the possibility of reaching big retail stores such as Wal-mart (Prahalad & Hammond, 2002). As a result, the traveling cost is an important decision factor at the moment of choosing a store for BOP consumers (Kunreuther, 1973).

- *Money is spent on brand products and luxuries*

At the BOP most of the money earned is not spent on sanitation, clean running water, and better homes, but rather in luxuries such as televisions, cell phones, blenders, and gas stoves (Prahalad, 2005). It exists a culture of buying products that are out of their economical range. For the BOP consumers is hard to spend money on services like sanitation or clean running water since they know that this is the government's responsibility, and they rather spend their money on unnecessary objects (Prahalad & Hammond, 2002).

Also, BOP consumers are brand conscious, these consumers have low self-esteem; buying brand products for them is a sign of social inclusion, acceptation and it is an aspiration for a better quality of life. Moreover, in certain articles such as food and cleaning products it makes sense for them to buy popular brands since they cannot take the risk of obtaining a low-quality product, this will mean a waste of money (Barki & Parente, 2014).

- *The BOP consume more cheap calories*

Cheap calories are the base of the diet for the BOP population; this diet consists of excessive consumption of processed food with a high amount of calories and a low nutritional value. This is caused by multiple reasons, first, cheap calories are less expensive than healthy food; this affects directly the BOP consumption pattern, which prefers to economize money by consuming unhealthy food. Besides, BOP consumers tend to watch more television, making them more susceptible to advertisings of mainstream companies who sell cheap calories (Neff et al., 2015).

On the other hand TOP population achieve higher levels of education, they have greater economic resources and investigate more to create a healthier diet (Variyam & Golan, 2002). Finally, the lack of access to supermarkets by the BOP also affects their consumption, since these retailers tend to offer healthier products than the small retailers do. It is important to remark that in the case of developed countries the presence of fast-food restaurants is stronger in BOP zones increasing the obesity rates of this population (Larson, Story, & Nelson, 2009).

- *Word of mouth and performance is important*

The performance of a product has a high influence on whether or not repurchasing a product. As stated, before when you subsist with a low income every cent that you spend counts, this is why BOP consumers cannot take the risk of buying products that will not accomplish their expectations (Chikweche & Fletcher, 2010). It is also important to remark that housewives tend to listen to the TV while they do their domestic labors such as cooking, ironing or cleaning, this is why they tend to be more susceptible to the advertisements of brand companies who can

afford TV commercials (Barki & Parente, 2014). Besides, word of mouth (WoM) marketing is important, since people buy articles based on the opinions of their family, friends or local retailers, a social network is an important key of information for purchasing decision making in the BOP (Beninger & Robson, 2015). BOP communities are very close communities where the neighbors and retail owners interact daily. Thus, treatment is friendlier than in middle-class and high-class neighborhoods; this allows people to share their experiences with certain products.

- *BOP consumers receive credits*

Receiving credits is a common activity for BOP consumers since they daily carry a small amount of money and savings are very rare among them. It is common to receive credits from family members, money lenders, shopkeepers, and commercial banks or cooperatives (Deaton & Subramanian, 1996). For example, according to Prahalad & Hammond, (2002), money lenders can charge interests between 10 and 15 percent per day and the interest rates per year are between 1,000 and 2,000 percent. Finally, Non-profit microfinance institutions charge between 40 and 70 percent interest per year to BOP entrepreneurs.

Offering credits has created good business models at the BOP market such as Casa Bahia in Brazil or Elektra in Mexico, who sell white goods in deferred loans (Prahalad, 2005). In the same way, this is why small retailers are BOP consumers' major source for FMCG products. Owners give credits to clients, these loans do not generate an extra fee, and it is important to remark that the intention of the small retailer owner is not making extra money from the credits offered, rather sell the product and help their client.

Besides, loyalty to the store and bonding with the owners is important for the customer to get a loan (Viswanathan, Rosa, Subrahmanyan, & Gomez-Arias, 2008). These examples demonstrate that with the right focus, companies can introduce their products to the BOP market, by also offering better quality and lower prices than their competitors offer.

2.3.3 Related Studies on the Base of the Pyramid Consumer Behavior

D'Andrea, Lopez-Aleman, et al., (2006) analyzed what middle-class and low-class consumers considered valuable at small retailers in Latin-American countries. Later on, Banerjee and Duflo, (2006) studied the consumption patterns and income generation of people who live with less than $2 in 13 developing countries around the world. Chikweche and Fletcher, (2010) investigated the factors that influence purchase decisions for subsistence consumers in Zimbabwe, this research evolved into studying the purchase decision making of each family member (Chikweche et al., 2012). Then Barki and Parente, (2014) identified and described the characteristics of the consumer behavior of people who live with less than $8 a day in Brazil. Finally, Kumar, Sunder, and Sharma, (2015) conducted a consumer decision-making study (CDMS) to evaluate the five most-used FMCG for BOP consumers in India.

On the other side Karnani, (2009) argues that the view of the poor as resilient, creative entrepreneurs and value-conscious consumers is empirically false. Idealizing the poor in his point of view does not help them; the lack of education and the cultural, economic and social deprivations makes poor people vulnerable. Especially by not regulating social mechanisms to protect the poor, for example by offering them microcredit and not creating enough work opportunities for them. For these reasons, governments must focus on helping the poor with programs, since the middle class is the one who most benefits from government programs.

Jaiswal and Gupta, (2011) analyzed how marketing influences the consumption of BOP clients in India, where marketing campaigns make the BOP consumers buy products outside of their consumption range, making them susceptible to sales, promotions, advertising, and celebrities endorsements as Table 5 shows.

Table 5 - Previous studies on Base of the Pyramid Consumer Behavior

Author	Country	Study	Buying characteristics
D'Andrea, Lopez-Aleman, et al., (2006)	Argentina, Brazil, Costa Rica, Mexico, Chile, and Colombia	Focus group surveys to middle-class and low-class small retailer clients, most of them females.	Consumers do not always go for the lowest-prices or second brands and relationship is a big incentive when they shop in small retailers
Banerjee and Duflo, (2006)	13 developing countries	Living Standard Measurement Surveys (LSMS) conducted by the World Bank and the "Family Life Surveys".	There is a tendency of spending a high amount of money on alcohol, tobacco, and entertainment.
		A household survey in slums. Study of the pattern of consumption of people who lives with less than $2 and less than $1.	Between 56 to 74 percent of their salary is spent on food, 10 percent of their food budget is spent on sugar, salt, and processed products and another 6 percent in cooking oil.
Karnani, (2009)		States that the view of the poor as resilient and creative entrepreneurs and value-conscious consumers is empirically false.	The government should focus on helping the poor with programs instead of romanticizing the idea of the poor as entrepreneurs.
Chikweche and Fletcher, (2010)	Zimbabwe	Investigate the factors that influence purchase decisions for subsistence consumers.	Price is an influential factor for buying a product, which is a link with two other factors, physiological needs, and product availability.
Chikweche et al., (2012)	Zimbabwe	Survey of the purchase decision making of each family member. One-to-one interviews focus groups.	Husbands are more involved in the purchase decision. Younger children have a low influence on purchase.

			Older children tend to support their families and take decisions to purchase products.
Barki and Parente, (2014)	Brazil	A qualitative interview with low-income housewives who live with less than $8 a day and also an interview with multinational companies' executives.	Low-income consumers like to be treated with dignity, prefer personalized attention while shopping, they like to feel socially included and abundance of products while shopping.
Jaiswal and Gupta, (2011)	India	Interview-based approach for an in-depth qualitative investigation of consumption behavior at the BOP.	A tendency for buying products outside of their consumption range, consumers are susceptible to sales, Promotions, advertising, and celebrity endorsements.
Kumar et al., (2015)	India	Consumer decision-making styles study focused on poor people living in India, to evaluate their preference of five most-used FMCG.	Poor consumers are moderately brand loyal. They pay a little attention to price, quality, and brand consciousness. Finally, they do not recommend brands and tend to repurchase the brands that fulfilled their expectations.

2.3.4 Opportunities at the Base of the Pyramid

The market opportunity for selling products at the BOP is big, considering its population of 4 billion people. Moreover, the use of new technologies can create new methods for attending this market, to achieve this, private companies, governments, and small retailers need to work together. Prahalad and Hammond (2002) suggest that the use of Information and Communication Technologies (ICT) can facilitate the participation of companies in the BOP market. The use of low-cost wireless networks and devices can connect the BOP economy to formal markets and ameliorate the transaction platforms and distribution channels. Also, the use of voicemail and voice recognition can help to connect with illiterate people, and e-commerce can connect directly with the BOP market avoiding the intermediaries.

For Fransoo and Blanco, (2012) there are opportunities in areas such as innovative vehicle designs that can facilitate the distribution of goods. Furthermore, the packaging of the products can be improved, since packaging varies depending on the purchasing power of the clients. Horizontal collaboration in urban logistics has the opportunity of reducing costs, in this collaboration stakeholders and governments need to work together to improve policies and reduce impacts. Frictionless retailing is also necessary, the use of cash limits the purchasing power of the small retailer owners and difficult the deliveries, the implementation of payments with credit and debit cards needs to adapt to the costumers and small retailers' needs.

2.4 Livability, equity, and affordability

To complete this study, it is important to consider factors that can associate with the living conditions of a community, to measure life quality, access to services, products, and purchasing power. For this study, we considered the terms equity, livability, and affordability, which are suitable to define the conditions of the BOP.

- *Equity*

According to the United Nations website equity is the level equality that the population receives in terms of living conditions and distribution of wealth. Dale and Newman (2009) proposed that equity is based on knowing who gets what and knowing if this distribution fulfills the standards of distributive justice. The authors confirm that livable communities nowadays are not necessarily accessible for most of the people, especially those at the BOP.

In the literature, there are several examples of studies on equity; Campbell (1996) created a triangle based on three perspectives of the city, equity, economy, and ecology. Campbell also considered the conflicting zones created between these perspectives that according to the author this will help in planning a sustainable city. The author concludes that achieving equity in a city is important; this is attained by redistributing the resources, services, and opportunities. The study of Campbell was then improved by Godschalk (2004), the author proposed a prism that includes livability to the perspective of a city for becoming sustainable. Godschalk (2004) indicated that there is tension between equity and livability, which creates a gentrification conflict caused by two different beliefs. The first belief is the preservation of poor neighborhoods located in the center of the cities for the actual population benefit. The second belief is to improve these neighborhoods to attract the middle and upper class.

- *Livability*

In urban developing livability is about providing habitable and quality services to the up and low classes (Dale & Newman, 2009). This term is used by organizations to measure urban development, to achieve these; organizations have used different criteria to quantify livability. For example, UN-HABITAT (2013) uses five criteria: productivity, infrastructure, quality of life, equity, and environmental sustainability. On the other hand, The Economist Intelligent Unit (2012) uses six criteria: namely stability, healthcare, culture and environment, education, infrastructure, and spatial characteristics. For Nastar, Isoke, Kulabako, and Silvestri (2019) it exists a gap between the quantitative approach expressed by numbers and the real experience of people living in urban areas. Pointing out that getting a high score in the criteria gave by organizations does not guarantee the real livability of a city and points out the importance of owning land-tittles, which increases livability. Finally, to improve livability it is necessary to improve civic collaborations with the local state, especially political parties, traditional leadership, NGOs.

- *Affordability*

In the literature there exist several definitions related to affordability, in the case of Nguyen (2005) housing affordability is the "*ability of a household to afford to house*", and to achieve this, no more than 30 percent of the household income has to be spent on housing. This definition is very restrictive since it includes households from all income levels, even when upper classes do not have a problem with spending more money on housing. A definition more adequate to this study refers to affordable housing as the availability of housing at cheaper prices and where the costs of transportation, quality of the neighborhood, and crowding conditions must be considered (Jana, Bardhan, Sarkar, & Kumar, 2016).

3. METHODOLOGY

The methodology used in this study is a survey to explore the perspective of the stakeholders involved in the delivery of FMCG. This survey will be applied to a sample of TOP and BOP populations located in neighborhoods of the municipality of Sao Paulo.

The nature of the study is descriptive and exploratory. It is descriptive because it aims to understand the point of view of carriers and small retailers regarding urban restrictions. At the same time, it is exploratory since it aims to understand the urban restrictions, the main characteristics of the local economy, and consumer behavior.

The district chosen for developing this study is Itaquera representing the BOP district. It is important to remark that also, the neighborhood of Vila Ré was taken into account for this study; this neighborhood is situated next to Itaquera and has the same economical characteristics. Itaquera and Vila Ré are known for being unsafe which poses bigger challenges to the distribution goods in terms of security (REDE NOSSA SÃO PAULO, 2018). On the other hand, Vila Mariana represents the TOP district. Vila Mariana, which is inside of the mini-road ring, has the distribution of goods hindered by stricter restrictions applied to freight transportation.

Besides, this study considers three stakeholders, consumers, small retailers, and carriers. It is important to note that each of these stakeholders has its questionnaire. The development of these questionnaires was made through an extended revision of the literature, to make sure that the survey addresses the real issues and the perspective of the stakeholders. The application of the surveys differs for each stakeholder. In the case of consumers, in-loco and online surveys were applied; for small retailers and carriers, the questionnaire was applied *in-loco.*

3.1 Methodology steps

The survey research process is an adaptation from the model suggested by Forza, (2002) as shown in Figure 3. It is important to remark the addition of one-step to this methodology, which is developing literature (Carvalho, 2017).

The decision to add the literature review is because it serves as a base for developing the questions for the surveys applied to the stakeholders. The main objectives of the literature review are to study the delivery process to small retailers in urban areas, identify the main characteristics of small retailers, define the consumer behavior of small retailers' clients, characterize the attributes related to services and infrastructure in BOP neighborhoods and understand the urban restrictions in the municipality of Sao Paulo.

In the theoretical level, the first step is to identify all the concepts, variables, and formal language involved in the area of study and the relation between these concepts. Later, the formulation of the theory will be developed; this will help to define the unit of analysis. The definitions obtained from this will be tested to make constructions that will turn into the hypothesis.

The design section is in charge to define all the necessary procedures, before implementing the data collection. This means that the researcher will delimitate the sample size of the study, the measurement instruments are selected, finally, a data collection method is chosen, which in this case are questionnaires.

Once all the questions of the survey are designed, the next step is to proceed to the application of the pilot test; this is mainly to identify problems with the survey that researches are not able to see. To accomplish this, colleagues, experts, and target respondents will respond to the pilot test. It is important to analyze if the instructions and questions are clear. In case the information is not clear the survey will be sent to the first step again and pass thru all the stages again until it passes the process of validation.

Once the survey passed the validation, the researcher can proceed to apply the survey; this section uses the same procedures applied in the pilot-testing but with a larger sample. This means collecting data, managing problems by non-respondents, data cleaning, and assess the quality.

Afterward, the information is reviewed by applying data analysis, which divides into preliminary data and hypothesis testing. Finally, a report is generated with all the results and analyses obtained, which in this case is this master thesis.

Figure 3 - Methodology steps
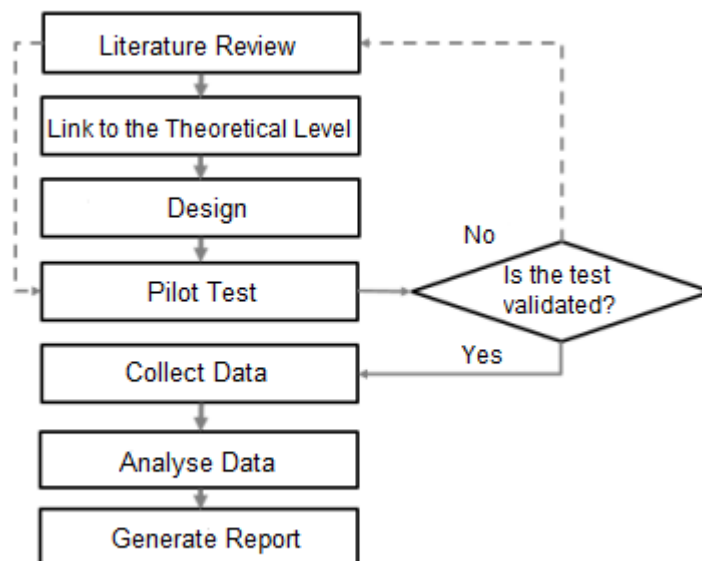
Source: Forza (2002) adapted by Carvalho, (2017)

3.2 Areas of Study

The selected areas for this study are the district of Itaquera and the neighborhood of Vila Ré representing the BOP, and Vila Mariana representing the TOP district. Figure 4 shows the location of these areas in the Sao Paulo municipality.

Figure 4 - Location of the regions of study and the mini-ring road

Source Cetsp

The district of Itaquera has a long history as a BOP area. The district is located in the eastern region of Sao Paulo (Zona leste) it has its origins as a crop field during the first decades of the XX century. Thru the pass of the years, people who migrated from other parts of Brazil settle in this district; then in the 1980s, it started the construction of projects for the BOP population. Nowadays this district counts with the metro station Corinthians-Itaquera, the shopping mall metro, and the Corinthians soccer stadium (D'Andrea, 2012), although it is located in a low-income region where only 1.27% of its population possess a formal job (REDE NOSSA SÃO PAULO, 2018). The district has an area of 14.60 km², a population of 204.871 inhabitants, and a demographic density of 14.032 Hab/km², (Prefeitura de Sao Paulo, 2019). Even though the development of this district is higher than other districts of the Sao

Paulo the majority of the population still makes part of the BOP. It is important to note that 6.89% of the population in the district of Itaquera lives in slums (REDE NOSSA SÃO PAULO, 2018); Finally, there are 1.77 deaths by homicide for every 10 thousand people (REDE NOSSA SÃO PAULO, 2016).

Vila Ré is a neighborhood located inside the district of Penha, is also located in the east region of Sao Paulo, and has its origins as a ranch during the XVII century. In the 1920s the district of Penha was occupied by Illegal invaders (Jornal Estadao, 2015). The district has an area of 11.30 km², a population of 127.820 inhabitants, and a demographic density of 11.312 Hab/km², (Prefeitura de Sao Paulo, 2019). In the district of Penha, only 2.72% of the population possess a formal job, also 6.56% of the population lives in slums (REDE NOSSA SÃO PAULO, 2018) and the homicide rate is 0.943 for each 10 thousand people (REDE NOSSA SÃO PAULO, 2016). Figure 5 shows the delimitation area of the Itaquera and Penha districts.

Figure 5 - Itaquera and Penha districts

Source: Prefeitura de Sao Paulo.

On the other hand, Vila Mariana is a district that makes part of the TOP, it is located in the south-central region of Sao Paulo inside the mini-road ring, and it possesses a vast number of luxury condominiums and antique townhouses (Massara, 2012). The district has an area of 8.60 km², a population of 130,484 inhabitants, and a demographic density of 15.173 Hab/km², (Prefeitura de Sao Paulo, 2019). The development of this district is notorious, almost 72,34% of its residents finished high school, which is a high percentage compared to the rest of the municipality which is 33,68% on average (Historico Vila Mariana, 2019). Since Vila Mariana is a business district it exists a vast offer of employment, 13,787.32 jobs for each 10 thousand people, also only 0.91% of the population lives in slums, and the homicide rate is 0.457 for each 10 thousand people (REDE NOSSA SÃO PAULO, 2016). Figure 6 shows the delimitation of the district of Vila Mariana.

Figure 6 - District of Vila Mariana

Source: Prefeitura de Sao Paulo

3.3 Sample and Population

This research consists of three groups of study, consumers, small retailers, and carriers. Since the objective of this research is to compare TOP and BOP districts, it is necessary to obtain the population and sample of the groups of study (consumers, small retailers, and carriers) of each district (Vila Mariana, Itaquera). The following paragraphs explain the processes for obtaining this data.

Consumers

The consumers are the population who lives in the districts of study (Vila Mariana, Itaquera). The data about the population was obtained from Sao Paulo's municipality website, which contains information on the latest census. Then the sample size was calculated as proposed by Cochran (2007), as it is shown in Equation 1. On the first visits, the researches tried to interview the consumers on the streets of the districts, this task resulted in difficultly and the location for the interviews was made outside small retailers, supermarkets, shopping malls, and parks.

Equation 1 - Sample size equation

$$\text{Sample size} = \frac{\dfrac{z^2 \times p\,(1-p)}{e^2}}{1 + \left(\dfrac{z^2 \times p\,(1-p)}{e^2 N}\right)}$$

N = population size
e = Margin of error (percentage in decimal form)
z = z-score

Source: Cochran 2007

The following values were considered to obtain the sample size, confidence interval (z) of 95% and a margin error (e) of 6% giving, as a result, a sample size of 267 interviewees (see Table 6).

Table 6 - Districts results of the sample size for the consumers

Parameters		Itaquera	Vila Mariana
Population	N	204.871	130.484
Confidence interval (z score)	z	95%	95%
Margin error	E	6%	6%
Sample size		**267**	**267**

Small retailers

In this case, it was not possible to find a reliable source that had the exact number of stores located in the districts of study. Since some small retailers do not have their business registered at São Paulo Commercial Registry, (Junta Comercial do Estado de São Paulo – JUCESP). Therefore, to calculate the population, all the stores inside the districts were located on Google maps. Subsequently, the researchers visited the stores for two reasons, to confirm the existence of these small retailers, and to find small retailers who do not appear on Google maps. Then, the researchers mapped the districts with the information and location of every store found. The information collected will represent the population of the districts, since it is a reliable and updated source of information. It is important to remark that the neighborhood of Vila Ré was considered only in this part of the study to expand the number of small retailers interviewed. These small retailers were considered in the population of Itaquera.

To calculate the sample it was also used a Confidence interval (z) of 95% and Margin error (e) of 6%. Table 7 shows the results of the ideal sample size of retailers in each district.

Table 7 - Sample size for the small retailers in the districts

Parameters		Itaquera	Vila Mariana
Population	N	300	174
Confidence interval (z score)	z	95%	95%
Margin error	E	6%	6%
Sample size		**141**	**106**

Carriers

In this case, the FMCG drivers of the companies will represent the carriers. Besides, this stakeholder is different from the consumers and small retailers, since it is not possible to measure all the deliveries made in the districts, and all the retailers have a different amount of providers. Hence, it was opted to interview all the FMCG drivers sighted in the district during the visits.

3.4.1 Questionnaire Design

Three questionnaires were designed, one for each group of this research, consumers, small retailers, and carriers. The structure of the surveys is composed of different types of questions. Rating scale questions, to evaluate services, products, and infrastructure of the districts, with a scale from zero to ten, being Zero the worst note and ten the best note. Besides, Multiple-choice questions were included to evaluate payment methods, vehicles, and consumer behavior. Open questions, to explore the information about the daily operation of the small retailers, such as the number of clients, days with the highest sales, average amount of money spent by the client. Finally, it was included a question regarding online collaboration with companies, and to explore the point of view of the clients regarding online shopping. Once the information was collected, descriptive statistics were applied to analyze the data such as mean, median, mode, range, and quartiles.

3.4.1 Consumers' Questionnaire

The consumer questionnaire (Appendix 1) divides into three blocks as shown in Table 8. Each block has a specific objective and literature that addresses these topics.

Block 1 Consumer behavior

The block aims to define how consumers behave while shopping in small retailers. As well as the reasons, why they buy products, payment methods, and shopping habits.

The block was based on D'Andrea, Lopez-Aleman, et al., (2006) who conducted a study to understand the success of small retailers in Latin-America. As well as Dholakia et al., (2018) studied the competitive advantages of small retailers in India and finally Prahalad, (2005) who studied the opportunities to sell products to the BOP. Based on the authors, three questions were created; these questions aim to explain why clients shop in small retailers.

The questions related to payment methods were based on the following authors. Talukdar, (2008) who studied the difference between prices in rich and poor neighborhoods and what originates these differences. Viswanathan et al., (2008) studied the factors that influence consumers and entrepreneurs at the BOP. Finally, Karnani, (2009) who stands that the BOP has been romanticized.

Finally, 5 questions related to shopping habits were created, to develop these questions were based on Yildiz, Heitz-Spahn, and Belaud, (2017) who studied the relation between consumer civic commitment and small retailer patronage. The questions explore the preferred days of the week for buying goods, the best time of the day for buying, how many times per day do they visit small retailers, the number of stores chosen for buying, and the favorite retail store for buying the majority of the good.

Block 2 Transportation and carrying

This block was based on Talukdar, (2008) who studied the difference between prices in rich and poor neighborhoods and what originates these differences. Prahalad, (2005) studied the strategies for selling products to the BOP. The block aims to identify the mean of transport that the respondent uses and how does the respondent carry its products.

Block 3 Infrastructure and services

This block was based on the studies of Banerjee and Duflo, (2006) in this study the authors identified the characteristics of the infrastructure and services at the BOP. Dekel et al., (2019) point out the relation between informal settlements and civic organizations to formalize these settlements. Karnani, (2009) who stands that the idolization of the BOP only affects the poor. Perlman, (2006) shows the effect of marginalization of the BOP is the result of violence, drug-traffic, and corruption. Das and Hammer, (2004) analyzed the quality of medical services in Dheli. The block aims to identify the perceptions related to the environment where the respondent lives; also, it evaluates the public and private services offered by the government and companies.

Table 8 - Consumers' questionnaire

Block of the questionnaire	Literature review	Specific objective
Block 1 **Consumer behavior**	(Prahalad, 2005), (D'Andrea, Lopez-Aleman, et al., 2006), (Dholakia et al., 2018), (Talukdar, 2008), (Kunreuther, 1973), (Viswanathan et al., 2008), (Karnani, 2009),(Yildiz et al., 2017)	BOP and TOP consumer attributes
Block 2 **Transportation and carrying**	(Talukdar, 2008), (Prahalad & Hammond, 2002)	
Block 3 **Infrastructure and services**	(Dekel et al., 2019), (Banerjee & Duflo, 2006), (Karnani, 2009), (Perlman, 2006), (Das & Hammer, 2004)	Attributes that hinder carriers for delivering goods

3.4.2 Small Retailers' Questionnaire

The small retailer questionnaire (Appendix 2) divides into four blocks as shown in Table 9. Each block has a specific objective and literature that addresses these topics.

Block 1 Consumer behavior

This block was based on Talukdar (2008) who studied the difference between prices in rich and poor neighborhoods and what originates these differences. Karnani (2009) stands that the idolization of the BOP population affects the poor. Viswanathan et al. (2008) studied the factors that influence consumers and entrepreneurs at the BOP. The block aims to identify perspective from the small retailer owner related to the practices of his clients.

Block 2 Transportation

This block was based on Talukdar (2008) who studied the difference between prices in rich and poor neighborhoods and what originates these differences. Prahalad (2005) studied the strategies for selling products to the BOP. The block aims to identify the mean of transport that the small retailers' owners use to buy products.

Block 3 Collaboration, distributor deliveries

This block was based on Fransoo and Blanco (2012) who studied the distribution and logistics of small retailers in developing countries. Kin, Ambra, et al. (2018) developed four mathematical models for delivering goods to small retailers. Boulaksil and Belkora (2017) compared two small retailers' distribution strategies pre-sales and van sales. Butrina et al. (2017) focused on the last 800 ft. of delivery by analyzing all the factors that are involved in the distribution. Sinha et al., (2017) interviewed small retailer owners to know what they consider adopting brands. The block aims to identify how the deliveries from the distributor take place.

Block 4 Infrastructure and services

This block was based on the studies of Banerjee and Duflo (2006) in this study the authors identified the characteristics of the infrastructure and services at the BOP. Dekel et al. (2019) point out the relation between informal settlements and civic organizations to formalize these settlements. Karnani (2009) stands that the idolization of the BOP affects the poor. Perlman (2006) shows the effect of marginalization of the BOP is the result of violence, drug-traffic, and corruption. Das and Hammer (2004) analyzed the quality of medical services in Delhi. The block aims to identify the perceptions related to the environment where the small retailers are located.

Table 9 - Small retailers' questionnaire

Block of the questionnaire	Literature review	Specific objective
Block 1 **Consumer behavior**	(Talukdar, 2008), (Viswanathan et al., 2008), (Karnani, 2009), (Kunreuther, 1973)	BOP and TOP consumer attributes
Block 2 **Transportation**	(Talukdar, 2008), (Prahalad, 2005)	
Block 3 **Collaboration, distributor deliveries, and demand**	(Fransoo & Blanco, 2012), (Kin, Ambra, et al., 2018), (Boulaksil & Belkora, 2017), (Butrina et al., 2017), (Sinha et al., 2017)	Attributes that hinder carriers for delivering goods
Block 4 **Infrastructure and services**	(Banerjee & Duflo, 2006), (Dekel et al., 2019), (Karnani, 2009), (Perlman, 2006), (Das & Hammer, 2004)	

3.4.3 Carriers' Questionnaire

The carriers' questionnaire (Appendix 3) divides into three blocks as shown in Table 10. Each block has a specific objective and literature that addresses these topics. Different from the small retailers and the consumers' questionnaire, the

carriers' questionnaire aims to create insights about the perception of the deliveries from these actors. The questionnaire is smaller and has fewer blocks than the other two questionnaires, this is due to the lack of time that FMCG drivers have to respond since they were interviewed during their working hours.

Block 1. Driver profile

The first block aims to explore basic information about the driver such as experience time and the regions where he makes the deliveries.

Block 2. Delivery in Sao Paulo

The block is based on the study made by Fransoo and Blanco (2012) regarding the distribution and logistics of small retailers in developing countries. The block aims to explore basic information about the deliveries, such as time of the day for making deliveries, payment methods, the number of retailers serve per day and days with the highest number of deliveries.

Block 3. Issues referring to freight distribution in SP

The block aims to explore the perception of the carriers related to the infrastructure of the places where they work. This block was based on the studies of Banerjee and Duflo (2006) which identifies the characteristics of the infrastructure and services at the BOP. Dekel et al. (2019) point out the relation between informal settlements and civic organizations to formalize these settlements. Perlman (2006) shows the effect of marginalization of the BOP is the result of violence, drug-traffic, and corruption.

The block also aims to explore the perception of the carriers related to the Last-mile delivery to do this the study is based on the studies of (Dablanc, 2007) which study the characteristics of urban freight in European cities. As well as the study developed by Vieira and Fransoo, (2015) who analyzed the deliveries are affected by the urban restrictions inside the cities. Finally, the study of Vieira et al.

(2015) explored the perception if shippers and carriers about the delivery of goods in megacities.

Table 10 – Carriers' questionnaire

Block of the questionnaire	Literature review	Specific objective
Block 1 **Driver profile**	Not necessary	Basic information of the carriers
Block 2 **Delivery in Sao Paulo**	(Fransoo & Blanco, 2012)	Attributes that hinder carriers for delivering goods
Block 3 **Issues referring to freight distribution in Sao Paulo**	(Banerjee & Duflo, 2006)(Dekel et al., 2019)(Perlman, 2006)(Dablanc, 2007)(Vieira & Fransoo, 2015)(Vieira et al., 2015)	

3.5 Data Collection

The data collection for the small retailers and consumers in Vila Mariana took place from February to June 2019, thru *in-loco* visits of the district. In the case of Itaquera, the data collection for the consumers and small retailers took place from June to December of 2019 through in-loco visits. In addition, to obtain a higher amount of responses it was created an online version of the consumers' questionnaire. The online survey was created via Google forms, it is important to remark that the online survey was only addressed to consumers of Itaquera.

Itaquera

Table 11 shows the response rate of the consumers in the district of Itaquera. In the district, 182 consumers agreed to take the survey, from which two consumers did not finish to respond to the questionnaires, giving, as a result, a population of 180 consumers. Besides, 165 respondents indicated that they live in Itaquera, and 17 live close to the district. Even though 17 respondents did not belong to Itaquera they were still considered for the study since these neighborhoods also represent

BOP neighborhoods. From the 182 respondents, 124 are females and are 58 males, and the average age is 36.81 years.

Table 11 – Consumers' response rate in Itaquera

	Female	Male	Total per district
Itaquera	113	52	**165**
Other	11	6	**17**
Total per sex	**124**	**58**	

Table 12 shows the response rate of the small retailers in Itaquera, in which 154 retailers responded to the survey.

Table 12 - Small retailers' response rate in Itaquera

Type of retailers	Respondents (%)
Small retailer	70 (45.45%)
Mini market	34 (22.07%)
Supermarket	3 (1.94%)
Greengrocery	16 (10.38%)
Butchery	14 (9.09%)
Bakery	4 (2.59%)
Bar	12 (7.79%)
Candy shop	1 (0.64%)
Total	154 (100.00%)

Figure 7 shows the location of the retailers in Itaquera, it is possible to note that Vila Campanela, Jacupeval, and Jardim Itapemirim have the highest concentration of small retailers. Such is the case of bars, which are also located in Vila Campanela. On the other hand, mini-markets are spread across the district.

Figure 7 - Retailers in Itaquera
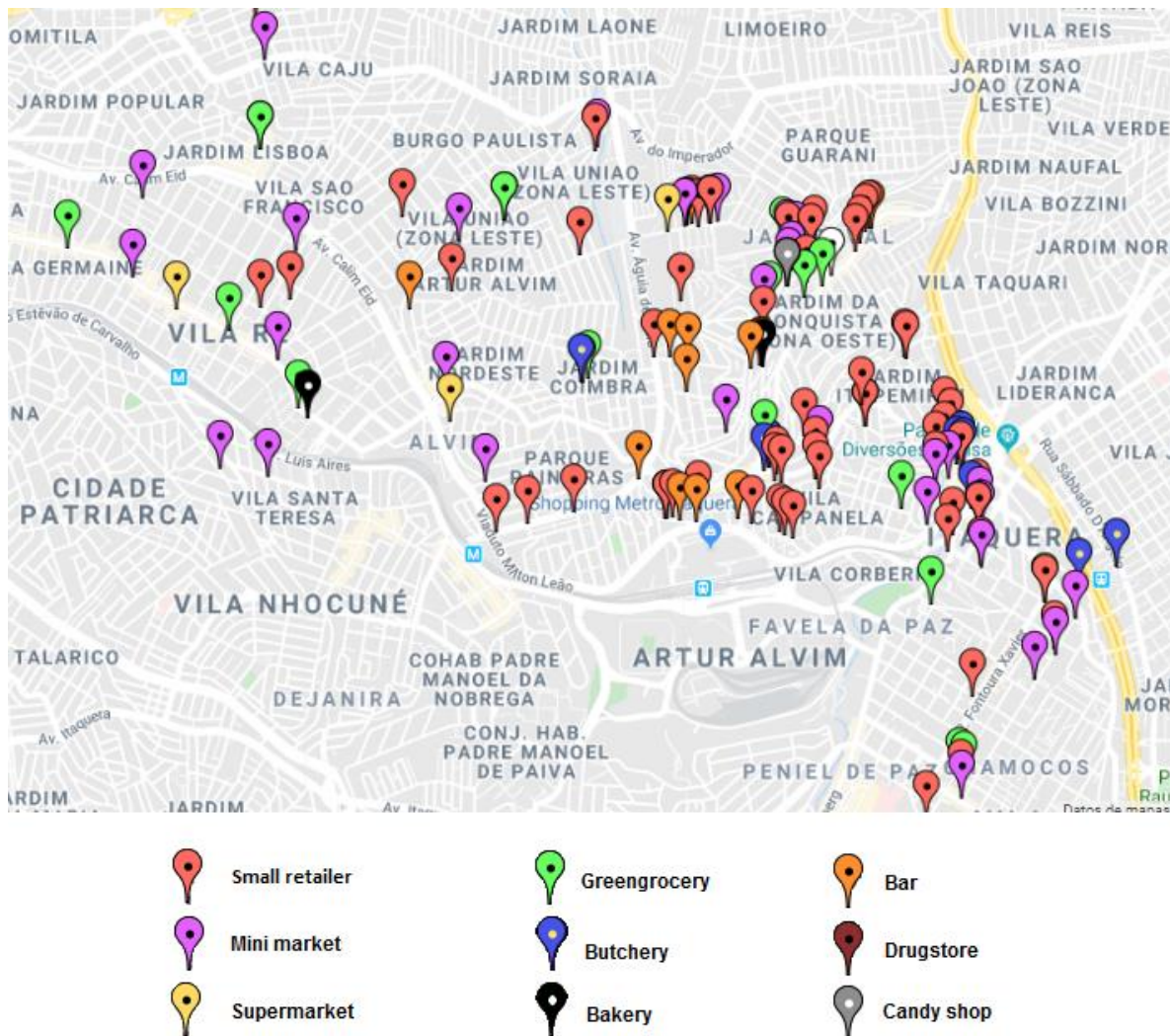
Vila Mariana

On the other hand, Table 13 shows the response rate of the consumers in the district of Vila Mariana, which contains the responses of 41 consumers. Besides, 31 of the respondents indicated that they live in Vila Mariana, and ten respondents live close to the district. The 10 respondents who did not belong to Vila Mariana are considered for the study since their neighborhoods are close to Vila Mariana and also belong to the TOP. Of the 41 respondents, 29 are females and 12 are males, and the average age is 44.82 years.

Table 13 - Consumers' response rate in Vila Mariana

	Female	Male	Total per district
Vila Mariana	21	10	**31**
Other	8	2	**10**
Total per sex	**29**	**12**	

Table 14 shows the response rate of the small retailers in Vila Mariana; in the district were identified 174 retailers, from which 92 retailers responded to the survey (53% of the population). It is important to remark that from the 92 retailers, 54.9% make part of a retail chain.

Table 14 - Small retailers' response rate in Vila Mariana

Type of retailer	Respondents (%)
Small retailer	13 (14.13%)
Mini Market	21 (22.82%)
Butchery	7 (7.60%)
Bakery	14 (15.21%)
Candy shop	16 (17.39%)
Drugstore	21 (22.82%)
Total	92 (100.00%)

As Figure 8 shows, in Vila Mariana exists a higher concentration of mini-markets, drugstores, and candy shops, the spread of the retailers is more even and it doesn't contain a specific area with a high concentration of a specific kind of retailer.

Figure 8 - Retailers in Vila Mariana
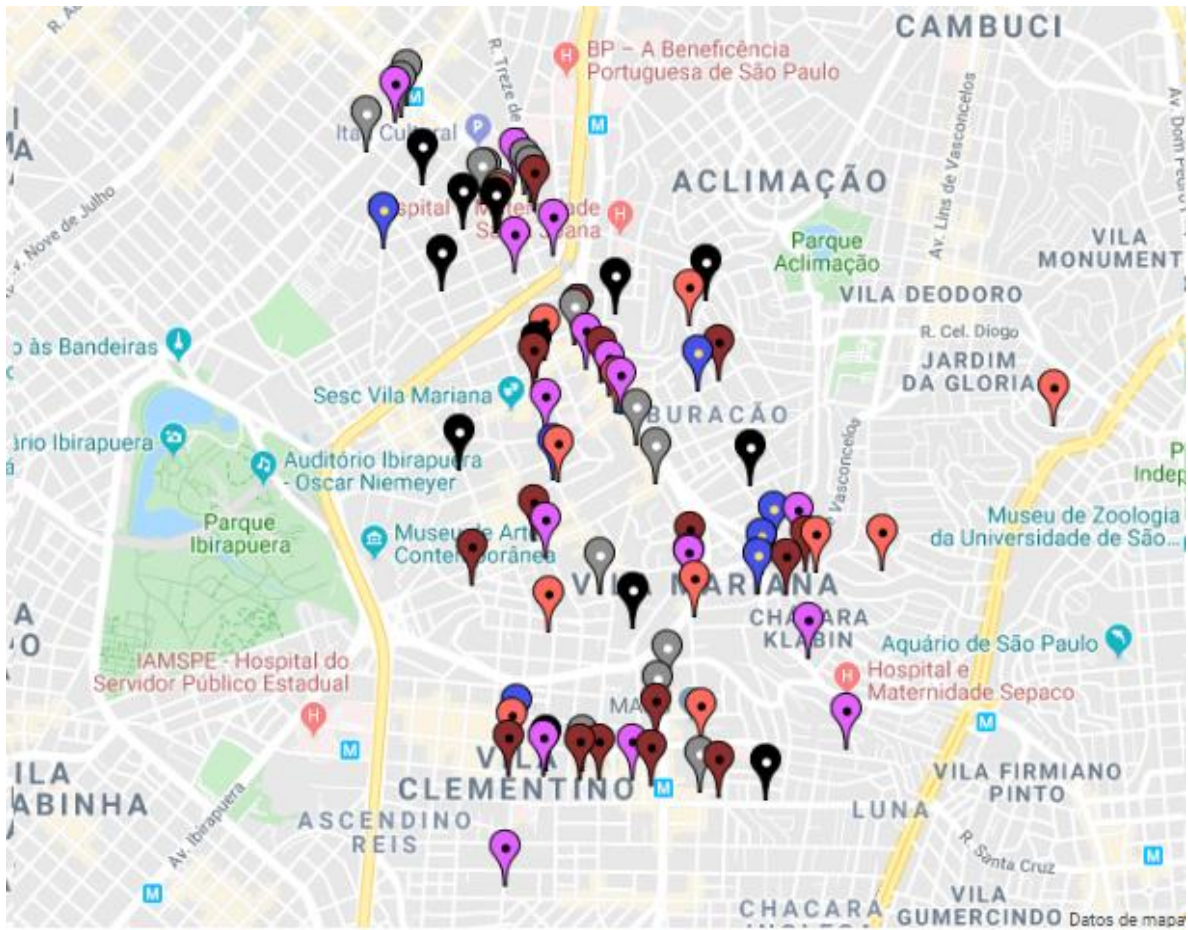
🔴 Small retailer	🟢 Greengrocery	🟠 Bar
🟣 Mini market	🔵 Butchery	🟤 Drugstore
🟡 Supermarket	⚫ Bakery	⚪ Candy shop

4. DATA ANALYSIS

The following information shows the results gave by the consumers and small retailers in Vila Mariana and Itaquera. The information shows the responses of the consumers and small retailers questionnaires, which are divided by blocks.

4.1. Analysis of the consumers

4.1.1 Consumer behavior

Itaquera

In the district of Itaquera, the population of consumers indicated that "Milk, bread and derived products" (77.78%) and "Vegetables/legumes/fruits" with (62.78%) are the products that they buy the most from small retailers, followed by "Meat and eggs" with 56.11% of the responses and which are bought daily. Besides, 75.56% of the respondents indicated that they do not buy "Alcohol and cigarettes".

Consequently, the respondents indicated that the types of goods that they buy the most in other types of stores are "Cleaning products" with 49.44% of the responses followed by "Personal hygiene products" and "Cereals and grains" with 48.89% of the responses respectively.

The average amount of money that the respondents spend in a small retailer varies between 30-50 Reais with 35.00% of the responses. Also, the most used payment method is "Debit card" with 45.56% of the responses. More than half of the respondents said that they "Buy products from one small retailer" (47.22%), and they think that "Small retailers' prices compensate for the proximity" to their household (55.00%).

Consumers also "Visit small retailers one time per day to buy goods" (74.44%) and the most common time of the day for visiting a small retailer are "Morning" (31.11%), "Afternoon" (30.00%) and "Night" (28.33%). Finally, "Saturday and Sunday" are the favorite days of the week for visiting a small retailer (45.60%).

It is important to remark that 78.88% of the respondents indicated that they buy most of their goods from formal retailers "Super/Hypermarkets" and they buy in small retailers in case of emergencies. In the same way, 66.66% of the consumers chose "Not having the product that they are looking for" as the biggest obstacle for not buying in a small retailer.

As Table 15 shows, consumers responded that the main reason why they buy in small retailers is "Proximity" the attribute obtained a median of 9.00, which means that at least 50% of the respondents gave a score greater or equal to 9.00. Furthermore, the attribute "Buying in small quantities" possesses a positive median of 7.00, which means that at least 50% of the respondents consider the attributes important. This attribute is followed by "Quality of the products", "Opening hours", "Close relationship with the owner" and "Buy what you forgot while shopping" where at least 50.00% of the respondents gave a score equal or higher to 7.00 and 25.00% gave a score equal to 9.00 in the four attributes.

On the other hand, 75% of the respondents considered "Home delivery" as an attribute that is not important at all, when buying from small retailers, and which obtained a mode and a median of zero. Also, the attribute "buying by order" it is also not important since at least 50% of the respondents gave a score lesser or equal to 1.00. Finally, "Credit" is the third least important attribute, contrary to the attributes mentioned above; "Credit" has a more normal distribution of its values since the mean (3.83) and the median (4.00) are close.

Table 15 – Consumers' considerations about small retailers in Itaquera

Attributes	Mean	Mode	Q1	Md	Q3
Proximity	7.49	10.00	5.00	9.00	10.00
Variety of products	5.23	5.00	2.00	5.00	8.00
Credit	3.83	0.00	0.00	4.00	7.00
Price	5.33	10.00	2.00	5.00	8.00
Paying with a credit or a debit card	5.76	10.00	2.00	6.00	10.00
Quality of the products	6.18	10.00	4.00	7.00	9.00
Promotions	4.89	0.00	1.00	5.00	8.00

Buying in small quantities	6.30	10.00	4.00	7.00	10.00
Home delivery	2.54	0.00	0.00	0.00	5.00
Opening hours	5.76	10.00	2.00	7.00	9.00
A close relationship with the owner	5.99	10.00	3.00	7.00	9.00
Buy what you forgot while shopping	5.95	10.00	3.75	7.00	9.00
Products popularity	4.91	0.00	1.00	5.00	8.00
Buying by order	2.88	0.00	0.00	1.00	6.00

Vila Mariana

In Vila Mariana consumers indicated that the products that they buy the most from small retailers are "Milk, bread and derived products" with 43.90%, "Vegetables/legumes/fruits" with 39.02%, and "Meat and eggs" with 36.59%. On the other hand, 63.41% of the respondents indicated that they do not buy "Alcohol and cigarettes". It is important to remark that in the study of Vila Mariana the consumers did not respond to questions related to the "Frequency of buying in small retailers", and "Type of product bought in another store".

In Vila Mariana, 60.97% of the consumers stated that they spend more than 50 Reais in a small retailer. The most used payment methods are "Credit card" with 58.53% and "Debit card" with 36.58%. Besides, almost half of the respondents said that they only "Buy products from two small retailers" (48.78%); this coincides with the results of Table 16, where consumers stated that a close relationship with a small retailer is not an important variable for choosing a store. Besides, 58.53% of the respondents agreed that the proximity of small retailers compensates the price.

Consumers "Do not visit more than one time per day small retailers" (90.24%). The most common time of the day for visiting a small retailer is during the "Night" (31.70%), it is important to remark that also another 31.70% indicated that they do not have a particular time of the day. Most of the responses for favorite day of the week for buying in small retailers were distributed between "Saturday and

Sunday" (41.46%), "Wednesday" (39.02%), "Friday" (34.14%) and "Tuesday" (31.70%).

It is important to remark that 78.04% of the respondents indicated that they buy most of their goods from "Super/Hypermarkets", which brings an interesting insight since this value is similar to the results of Itaquera. Besides, the biggest obstacle for consumers not buying in a small retailer is "Not having the product that they are looking for" with 78.04% of the responses.

In the case of the considerations for buying in small retailers, the results of Vila Mariana proved to be similar to the ones obtained in Itaquera, except from "Variety of products" and "Promotions". First, the attribute "Proximity" is considered the most important, with at least 75% of the respondents giving a score greater or equal to 10.00, and at least 50% giving a score equal to 10. Followed by "Paying with a credit or a debit card" which also 75% of the respondents gave a score equal to 10, but on the other hand, the values are more dispersed, since at least 25% of the respondents gave a score lesser or equal to 5.00. Differently to the results of Itaquera consumers in Vila Mariana consider "Quality of the products" and "Buy what you forgot while shopping" as important attributes. For both attributes, at least 50% of the respondents gave a score higher than or equal to 8.00.

Finally, as well as in Itaquera "Buying by order" and "Home delivery" are the least important considerations for buying in small retailers. The scores are very low with at least 75% of the sample giving a score smaller or equal than one for "Buying by order" and smaller or equal than two for "Home delivery". In the case of "Credit" at least 50% of the sample gave a score equal or lesser than 2.00, also the attribute presents a small dispersion since the mean (2.93) and the median (2.00) are close values, as Table 16 shows.

Table 16 – Consumers' considerations about small retailers in Vila Mariana.

Attributes	Mean	Mode	Q1	Md	Q3
Proximity	8.41	10.00	8.00	10.00	10.00
Variety of products	6.49	8.00	5.00	7.00	9.00
Credit	2.93	0.00	0.00	2.00	6.00
Price	5.44	7.00	3.00	6.00	8.00
Paying with a credit or a debit card	7.39	10.00	5.00	10.00	10.00
Quality of the products	6.83	8.00	5.00	8.00	9.00
Promotions	6.15	5.00	5.00	7.00	9.00
Buying in small quantities	6.61	10.00	4.00	8.00	10.00
Home delivery	1.63	0.00	0.00	0.00	2.00
Opening hours	6.66	10.00	5.00	8.00	9.00
A close relationship with the owner	4.98	5.00	2.00	5.00	7.00
Buy what you forgot while shopping	6.78	8.00	5.00	8.00	9.00
Products popularity	4.98	0.00	1.00	6.00	8.00
Buying by order	1.22	0.00	0.00	0.00	1.00

4.1.2 Transportation and carrying

Itaquera

Consumers in the district of Itaquera indicated that the mean of transportation that they use to buy groceries is by "Walking" with 47.78% of the responses and using a "Car or pick-up" with 39.44%, as Figure 9 shows.

Furthermore, to carry the goods, most of the consumers use "Plastic bags offered by the small retailer" with 61.67%, followed by "Personal carry-on bag" with 19.44% of the responses.

Vila Mariana

On the contrary consumers in the district of Vila Mariana prefer to use their "Car or Truck" to buy goods (70.73%) while only 29.26% prefer to "Walk" as shown in Figure 9.

Besides, to carry the goods, consumers prefer to use "Market bags" with a response of 60.97% while "Plastic bags" offered by the small retailer used only by 24.39%. These values indicate that consumers in Vila Mariana are more aware of the pollution that plastic bags generate, this can be ironic since they prefer to use a "Car or truck", which are vehicles that also pollute.

Figure 9 – Consumers' mean of transportation in Itaquera and Vila Mariana
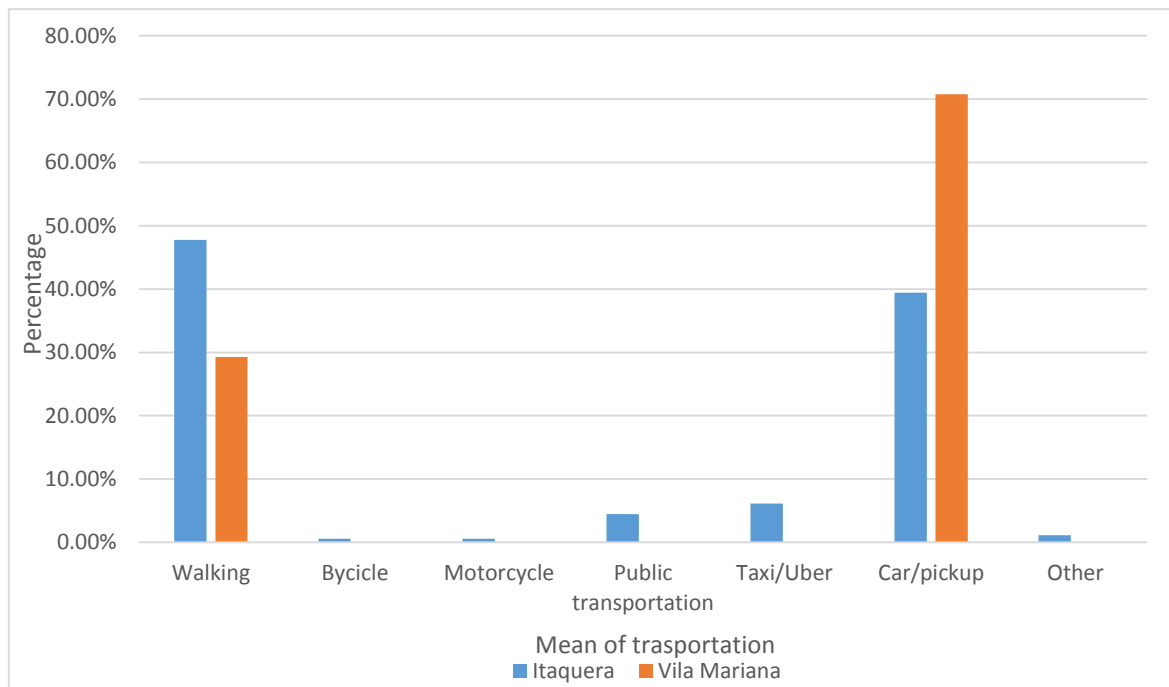
4.1.3 Infrastructure and services
Itaquera

In general, consumers do not have a good perception of the district of Itaquera in terms of infrastructure and security. However, the attributes with the best perceptions are "Public transportation" and "Public lighting" which obtained means of 5.20 and 5.11 respectively. This means that the distribution of the data is normal

since both attributes have a median of 5.00. It is important to note that the attributes "Conditions of the streets and sidewalks", "Park the car on the street", "Stealing cases" and "Robberies" obtained the lowest scores, at least 75% percent of the respondents gave a score lower or equal to 5.00. Also, the means of these attributes range between 3.27 and 3.64, therefore the distribution of the values is normal, as Table 17 illustrates. In summary, we can state that the consumers of Itaquera do not feel safe at all leaving their cars on the street since they consider that robberies and stealing cases occur quite often.

Table 17 – Consumers' perception of Itaquera

Attributes	Mean	Mode	Q1	Md	Q3
Park the car on the street	3.46	0.00	0.00	3.00	5.00
Police presence	4.39	5.00	3.00	5.00	6.00
Condition of the streets and sidewalks	3.27	0.00	1.00	3.00	5.00
Walk on the streets	3.92	5.00	2.00	4.00	6.00
Car traffic	4.43	5.00	2.00	5.00	6.00
Public transportation	5.20	5.00	3.00	5.00	7.00
Public lighting	5.11	5.00	3.00	5.00	7.00
Stealing cases	3.52	0.00	1.00	3.00	5.00
Robberies	3.64	0.00	1.00	3.00	5.00

In the case of the services offered in Itaquera, the consumers consider "Drinking water" the best attribute, in which at least 50% of the interviewees gave a score equal or higher to 7.00. Followed by "Trash collection" and "Electricity" which obtained a median of 7.00 and 6.00 respectively, and in the case of "Trash collection", at least 25% of the respondents gave a score equal or higher to 9.00. On the contrary, the attributes "Security" and "Community centers" obtained medians of 3.00 and at least 75% of the respondents gave a score equal or lower to 5.00, this demonstrates that people do not feel secure in the region and that it exits a lack of public facilities that offer cultural and educational activities in the district. Finally, the attributes "Parks" and "Gas pipelines" do also obtained poor reviews, for both

attributes; at least 50% of the respondents gave a score equal or lower to 3.00 as Table 18 shows.

It is interesting to note that when the respondents were asked how they consider the prices of the services offered in their district, 51.67% of the consumers think the prices are "Expensive" while 48.33% think prices are "Medium" and none of the respondents considered that the prices are "Low".

Table 18 – Consumers' perception of services in Itaquera

Attributes	Mean	Mode	Q1	Md	Q3
Electricity	5.75	10.00	2.00	6.00	8.00
Sewage	5.40	8.00	2.00	6.00	8.00
Schools	4.75	5.00	2.00	5.00	7.00
Parks	3.61	0.00	1.00	3.00	6.00
Community centers	3.60	5.00	1.00	3.00	5.00
Landline	4.50	0.00	1.00	5.00	7.00
Cable TV	5.16	8.00	2.00	5.00	8.00
Postal services	5.29	10.00	2.00	5.00	8.00
Drinking water	6.01	10.00	3.00	7.00	9.00
Security	3.35	0.00	1.00	3.00	5.00
Hospitals and medical centers	3.69	0.00	1.00	4.00	6.00
Streets	3.90	5.00	1.00	4.00	6.00
Churches	5.90	10.00	3.00	6.00	9.00
Internet	4.89	1.00	2.00	5.00	8.00
Gas pipelines	3.98	0.00	0.75	3.00	7.00
Trash collection	5.90	10.00	2.00	7.00	9.00

Vila Mariana

In the case of Vila Mariana, the perception of the consumers is slightly higher, in terms of infrastructure, compared to Itaquera. Besides, contrary to the data collected in Itaquera, the attribute "Park the car on the street" received the highest amount of positive reviews in Vila Mariana, since at least 50% of the interviewees gave a score higher or equal to 7.00. The attributes "Police presence", "Walk on the

streets", "Car traffic", "Stealing cases" and "Robberies" received regular reviews since all of them obtained a median of 5.00, and in all the attributes at least 25% of the respondents gave a score equal or higher to 3.00, except from "Car traffic". Finally, the attributes "Condition of the streets" and "Public lighting" are perceived as poor, since at least 50% of the consumers gave a score equal or less than 4.00 as Table 19 shows.

Table 19 – Consumers' perception of Vila Mariana

Attributes	Mean	Mode	Q1	Md	Q3
Park the car on the street	5.68	7.00	3.00	7.00	8.00
Police presence	4.22	5.00	3.00	5.00	5.00
Condition of the streets and sidewalks	4.24	1.00	2.00	4.00	6.00
Walk on the streets	4.98	4.00	3.00	5.00	7.00
Car traffic	5.44	5.00	4.00	5.00	7.00
Public transportation	-	-	-	-	-
Public lighting	4.71	4.00	3.00	4.00	7.00
Stealing cases	4.85	5.00	3.00	5.00	6.00
Robberies	4.80	5.00	3.00	5.00	7.00

On the other hand, it was possible to perceive a notable difference between the services offered in Vila Mariana and Itaquera. The consumers of the TOP region gave "Sewage", "Gas pipelines", "Trash collection" and "Postal services" very positive scores, all of these attributes have a median of 9.00 and a score of 10.00 in the third quartile. This means that at least 50% of the consumers gave a score of 9.00 and at least 25% chose 10.00, which is the highest score. At the same time, "Parks" and "Community centers" obtained the lowest scores with a median of 2.00 for each attribute. In the case of "Parks", at least 25% of the sample gave a score of Zero, as Table 20 shows. It is important to remark that these two attributes are also among the lowest in Itaquera, which means that even though the services are perceived as better in Vila Mariana, it exists a poor investment from part of the government in leisure activities for the residents of the two districts.

Moreover, when the consumers were asked about how they consider the prices of the services in Vila Mariana, 65.85% consider the prices are "Medium" while only 34.14% consider the prices as "Expensive". These answers are completely the opposite compared to the results of Itaquera, thus it can be deduced that residents of Vila Mariana indeed have a greater purchasing power.

Table 20 – Consumers' perception of services in Vila Mariana.

Attributes	Mean	Mode	Q1	Md	Q3
Electricity	6.83	10.00	5.00	7.00	9.00
Sewage	8.07	10.00	7.00	9.00	10.00
Schools	7.29	10.00	6.00	8.00	9.00
Parks	2.27	0.00	0.00	2.00	4.00
Community centers	2.83	0.00	1.00	2.00	5.00
Landline	6.54	10.00	4.00	7.00	9.00
Cable TV	7.17	10.00	6.00	7.00	9.00
Postal services	8.24	10.00	8.00	9.00	10.00
Drinking water	8.02	10.00	7.00	9.00	10.00
Security	5.20	6.00	5.00	6.00	7.00
Hospitals and medical centers	5.15	6.00	3.00	5.00	7.00
Streets	4.76	5.00	4.00	5.00	7.00
Churches	5.27	5.00	3.00	5.00	8.00
Internet	6.68	7.00	5.00	7.00	9.00
Gas pipelines	7.85	10.00	7.00	9.00	10.00
Trash collection	8.00	10.00	7.00	9.00	10.00

4.1.4 Consumers' crossed analysis

Crossed analysis of consumers' perceptions by sex

In this part is analyzed the perceptions of the consumers by sex and without taking into account the district where they come from.

In the case of perception of their districts, it is interesting to note that male consumers tend to give slightly higher scores than females. Male medians are

between 1.00 and 1.50 points higher, except from "Public Lightning", which obtained a median of 5.00 in both sexes. Also, the highest score was obtained by the attribute "Public Transportation" when males evaluated it; in this case, the attribute obtained a median of 6.00. It is important to remark that the rest of the attributes for both sexes obtained negative reviews, with medians that oscillate between 3.00 and 5.00 as Table 21 shows.

Table 21 - Perception of the districts by sex

Attributes		Mean	Mode	Q1	Md	Q3
Park the car on the street	*Men*	**4.11**	**5.00**	**3.00**	**4.00**	**6.00**
	Women	3.76	0.00	1.00	3.00	6.00
Police presence	*Men*	**4.94**	**5.00**	**4.00**	**5.00**	**6.00**
	Women	4.09	5.00	2.00	4.00	6.00
Condition of the streets and sidewalks	*Men*	**3.79**	**5.00**	**2.00**	**4.00**	**5.00**
	Women	3.29	0.00	1.00	3.00	5.00
Walk on the streets	*Men*	**4.31**	**5.00**	**2.25**	**4.50**	**6.00**
	Women	4.03	5.00	2.00	4.00	6.00
Car traffic	*Men*	**4.79**	**5.00**	**3.00**	**5.00**	**6.75**
	Women	4.53	5.00	3.00	5.00	6.25
Public transportation	*Men*	**5.79**	**7.00**	**4.25**	**6.00**	**7.75**
	Women	4.93	5.00	3.00	5.00	7.00
Public lighting	*Men*	**5.31**	**5.00**	**4.00**	**5.00**	**7.00**
	Women	4.91	5.00	3.00	5.00	7.00
Stealing cases	*Men*	**3.99**	**0.00**	**1.25**	**4.00**	**6.00**
	Women	3.67	0.00	2.00	3.00	5.00
Robberies	*Men*	**4.26**	**5.00**	**2.00**	**5.00**	**6.00**
	Women	3.67	0.00	2.00	3.50	5.00

Similarly, when the services were evaluated by sex, male respondents gave again the highest scores; and females gave either smaller or equal scores than the males. In this case, "Trash collection" and "Drinking water" obtained the highest scores, both have a median of 8.00 and at least 25.00% gave a score equal or higher than 9.00, both scores belong to the male respondents.

Followed by "Drinking water" and "Trash collection" evaluated by the females, in which both have a median of 7.00 and at least 25.00% of the respondents gave a score equal or greater than 9.00, but due to the dispersion of the answers on the first quartile obtained lowers means.

Finally, the females gave the lowest score to the attribute "Parks" in which at least 50% of the respondents gave a score equal o smaller than 2.00. Then, it is followed by the attribute "Community centers" in which both sexes obtained a median of 300 and at least 25.00% of the respondents gave a score equal or lower to 1.00 as Table 22 shows.

Table 22 - Perception of the services offered in the districts by sex

Attributes		Mean	Mode	Q1	Md	Q3
Electricity	*Men*	6.43	8.00	5.00	7.00	8.00
	Women	5.72	10.00	2.00	6.50	9.00
Sewage	*Men*	6.29	10.00	5.00	7.00	8.75
	Women	5.71	1.00	2.00	6.00	8.00
Schools	*Men*	5.17	5.00	3.25	5.00	7.00
	Women	5.24	5.00	2.00	5.00	8.00
Parks	*Men*	3.61	0.00	1.00	4.00	6.00
	Women	3.24	0.00	1.00	2.00	5.00
Community centers	*Men*	3.76	5.00	1.00	3.00	5.75
	Women	3.32	1.00	1.00	3.00	5.00
Landline	*Men*	5.11	10.00	1.00	5.00	8.00
	Women	4.76	0.00	1.00	5.00	8.00
Cable TV	*Men*	5.99	8.00	4.00	6.50	8.00
	Women	5.32	10.00	2.00	6.00	8.00
Postal services	*Men*	6.10	8.00	4.00	7.00	8.75

	Women	5.72	10.00	2.00	6.00	9.00
Drinking water	***Men***	**6.84**	**10.00**	**5.00**	**8.00**	**9.00**
	Women	6.16	10.00	2.00	7.00	9.00
Security	***Men***	**3.89**	**0.00**	**1.25**	**4.50**	**6.00**
	Women	3.61	0.00	1.00	3.50	6.00
Hospitals and medical centers	***Men***	**4.27**	**3.00**	**2.00**	**4.00**	**6.75**
	Women	3.82	0.00	1.00	4.00	6.00
Streets	***Men***	**4.21**	**5.00**	**1.25**	**5.00**	**6.00**
	Women	3.99	5.00	1.00	4.00	6.00
Churches	***Men***	**5.91**	**5.00**	**5.00**	**6.00**	**8.75**
	Women	5.72	10.00	2.75	6.00	8.00
Internet	***Men***	**5.90**	**7.00**	**4.00**	**7.00**	**8.00**
	Women	4.91	7.00	2.00	5.00	8.00
Gas pipelines	***Men***	**5.20**	**0.00**	**2.00**	**5.00**	**8.00**
	Women	4.47	0.00	1.00	5.00	8.00
Trash collection	***Men***	**6.96**	**8.00**	**5.00**	**8.00**	**9.00**
	Women	5.98	10.00	2.00	7.00	9.00

Crossed analysis of consumer behavior by sex

It is possible to perceive how consumer behavior does also changes when is organized by sex. First, the majority of the males (42.86%) said that they usually buy products from "One" small retailer, while the majority of the females (41.72%) said that they usually buy from "Two" small retailers.

Second, 35.71% of the males prefer to buy at "Night" and 20.00% prefer to buy during the "Afternoon". On the other side, for females, the order is the opposite since 32.45% prefer to buy during the "Afternoon" and 25.83% prefer buying at "Night".

Third, both sexes agreed that they only go to small retailers once per day 74.29% of the males and 78.81% of the females affirm this. On the contrary, 65.71% of the males prefer buying on "Saturday/Sunday" while females prefer buying on "Wednesday" (30.46%), "Friday" (31.13%), and "Saturday/Sunday" (35.76%).

Finally, 52.86 of the males prefer to "Walk" when they are about to do the groceries and 41.43% prefer to use a "Car", while for females 40.40% prefer to "Walk" and 47.02% prefer to use a "Car".

Consumers' analysis between in-loco and online survey in Itaquera

As mentioned before in Itaquera were applied in-loco and online surveys to the consumers. In this section, the results will be analyzed, and the most significant differences will be pointed out.

In general, the questions related to consumer behavior did not show a big statistical difference. For example, the products that they mostly buy from a small retailer in which in-loco consumers chose "Milk, bread and derived products" (72.27%), "Soft drinks and juices" (66.67%) and "Vegetables/legumes/fruits" (65.15%). On the other hand, online consumers preferred "Milk, bread and derived products" (78.07%), "Vegetables/legumes/fruits" (61.04%), and "Meat and eggs" (54.39%).

Another difference is that 42.86% of the in-loco consumers prefer to pay with "Cash" and 41.43% pays with "Debit", while 48.25% of the online consumers pay with "Debit" and 23.68% pays with "Cash".

Besides, 72.73% of the in-loco consumers stated that they buy most of their products from "super/hypermarkets" while 82.46% of the online consumers stated the same thing.

Finally, 51.52% of the in-loco consumers prefer to "Walk" to the small retailers and 24.24% prefer to use a "Car", compared to 45.61% of the online consumers who prefer to "Walk" and the 48.25% who prefer to use a "Car".

On the other hand, questions related to the perception of the district showed a significant difference between in-loco and online surveys. For example, the consumers interviewed in-loco gave higher scores to the attributes "Presence of the police", "Condition of the streets", "Public transportation" and "Public lighting" who their medians are one point higher than the responses online, and "Walking on the

streets" which the median is two points higher than the online responses, as Table 23 shows. It is important to remark that the rest of the attributes related to the perception of the district did not show a significant statistical difference, thus they were not included in Table 23

Table 23 - Comparison between the perception of In-loco and Online surveys in Itaquera

	In-loco			Online		
	Q1	Md	Q2	Q1	Md	Q2
Presence of the police	3.00	5.00	6.00	2.00	4.00	6.00
Condition of the streets and sidewalks	2.00	4.00	5.00	1.00	3.00	5.00
Walk on the streets	2.00	5.00	6.00	2.00	3.00	5.00
Public transportation	4.00	6.00	8.00	3.00	5.00	7.00
Public lighting	5.00	6.00	8.00	3.00	5.00	6.00

It is important to remark that this difference is more notorious in the section of perception of the services, in which once again In-loco consumers gave higher scores. In this case, the medians of all attributes reviewed by the in-loco consumers were between two and four points higher than the scores gave by the online consumers as Table 24 shows. One explanation for this difference might be that people who are interviewed in-loco tend to give more positive reviews since they are asked about the region where they live. Besides, the fact that the interviewer was a foreign person could also make an impact, and people from the region might feel the need of giving a good impression about the place where they live.

Table 24 - Comparison between the perception of services between In-loco and Online surveys in Itaquera

	In-loco			Online		
	Q1	Md	Q2	Q1	Md	Q2
Electricity	6.00	8.00	10.00	2.00	5.00	8.00
Sewage	5.00	7.00	8.50	1.00	5.00	7.75
Schools	5.00	6.00	8.00	1.00	4.00	6.00
Parks	2.50	5.00	7.00	1.00	2.00	5.00
Community centers	2.50	5.00	7.00	1.00	2.50	5.00
Landline	1.50	5.00	8.00	1.00	4.00	7.00
Cable TV	5.00	7.00	9.00	1.00	4.00	7.00
Postal services	5.00	8.00	10.00	1.00	4.00	7.00
Drinking water	7.00	8.00	10.00	2.00	5.00	8.00
Security	1.00	5.00	6.00	1.00	2.00	5.00
Hospitals	3.00	5.00	7.00	0.00	2.00	5.00
Streets	4.50	5.00	6.50	1.00	3.00	5.00
Churches	6.00	8.00	10.00	2.00	5.00	7.00
Internet	5.00	7.00	9.00	1.00	3.00	7.00
Gas pipelines	0.00	5.00	8.00	1.00	2.00	6.75
Trash collection	7.00	8.00	10.00	1.25	5.00	7.75

Consumer behavior of people who buy their products from Small retailers

This section describes the consumer behavior of people who buy most of their goods from small retailers. It is important to note that only 18.32% of the whole sample in both districts buy from these retailers, from which 56.10% of these consumers are women and 43.90% are men.

Frequent small retailers consumers have an average age of 38.61 years. They usually buy "Milk, bread and derived products" (97.06%), "Meat and eggs" (88.24%), "Cleaning products" (82.35%), "Vegetables, legumes and fruits" (79.41), "Soft drinks and juices" (79.41%) and "Personal hygiene products" (73.53%).

Consumers spend more than 30 reals in a visit to a small retailer as 68.29% of the respondents confirm this. Moreover, 39.15% indicated that they usually pay with "Cash" and 36.59% pay with "Debit card".

Besides, consumers visit small retailers only one time per day (65.89%) and their favorite times of the day for buying is during the "Morning" (41.46%) and "Night" (29.27%). Concerning the days of shopping, consumers indicated that they prefer to buy on "Friday" (39.02%) and "Saturday and Sunday" (36.59%). Furthermore, 34.15% of the consumers said that they usually buy from "Three small retailers" while 29.27% buy from "Two small retailers" and 31.71% buy from "One small retailer".

A very interesting fact is that 65.85% of the consumers "Walk" to get to the small retailers and only 19.51% use a "Car"; in fact, this might be one of the most important factors for choosing to buy in a small retailer. This is supported by the attribute "Proximity" in which at least 50.00% of the consumers gave a score equal to 10.00 when they were asked for the main reasons for buying in a small retailer.

Consumers also considered important "Quality of the product", "Buying in small quantities", "Opening hours" and "Close relationship with the owner", all of these attributes obtained a median of 8.00 and at least 25.00% of the respondents gave a score equal to 10.00. It is important to remark that "Close relationship with the owner" matches with the study of (D'Andrea, Lopez-Aleman, & Stengel, 2006) and "Buying in small quantities" which is a common practice of small retailer consumers (Amine & Lazzaoui, 2011; Sinha, Gupta, & Rawal, 2017).

Finally, 80.48% of the consumers considered that the prices in a small retailer compensate for the distance traveled, which also matches with the attributes "Proximity" and "Walking". Finally, 60.93% of the respondents indicated that "Not having the product they are looking for" is the highest obstacle for buying in a small retailer and 56.10% of them use "Plastic bags" to carry their goods.

4.2. Analysis of small retailers
4.2.1 Consumer behavior
Itaquera

Small retailers of Itaquera indicated that their clients pay more with "Cash" (40.26%), followed by "Debit card" (37.01%) and "Credit card" (15.58%). The time of the day with more clients is during the "Morning" with 24.03% and "Night" and "Afternoon" with 24.68% respectively. Besides, the retailers indicated that the

products with more demand are "Popular brands" representing 47.40% of the answers. From the respondents, 81.81% indicated that "Saturday and Sunday" are the days with the highest sales; followed by "Friday" with 42.85%; the rest of the days got less than 28.50% of the votes. Also, 38.31% of the small retailers said that consumers spend on average more than 50 reais per visit.

According to the small retailers, the products with more demand are "Soft drinks and juices" which obtained a median of 8.00 and at least 25.00% of the sample gave a score equal to 10.00. This attribute is followed by "Milk, bread and derived products" and "Alcohol and cigarettes" which both obtained a median of 7.00, and 25.00% of the small retailers gave a score equal to 10.00. At the same time, "Canned foods" received the lowest median, with a score of 5.50 but still at least 25.00% of the respondents gave a score of 8.00. Followed by "Cereals/grains" which received a median of 6.00, as Table 25 shows.

Table 25 - Demand of products, perception of small retailers in Itaquera

Attributes	Mean	Mode	Q1	Md	Q3
Cereal/Grains	5.74	10.00	3.00	6.00	8.00
Vegetables/legumes/fruits	5.90	10.00	3.00	7.00	9.00
Canned foods	5.51	5.00	3.00	5.50	8.00
Alcohol and Cigarettes	6.07	10.00	3.00	7.00	10.00
Personal hygiene products	5.79	10.00	3.50	6.00	8.50
Milk, bread and derived products	6.42	10.00	3.00	7.00	10.00
Meat and eggs	6.56	10.00	5.00	7.00	9.00
Sugar and sweets	6.53	10.00	5.00	7.00	9.00
Soft drinks and juices	6.89	10.00	5.00	8.00	10.00
Cleaning products	5.78	8.00	3.00	6.50	8.00

Vila Mariana

Small retailers of Vila Mariana indicated that the use of cards is more popular in their region, "Debit" and "Credit" are the most used payment method with 45.86% and 36.31% respectively. The average amount of money spent by the consumers is 41.60 reais and consumers mostly buy "Popular brands" with 44.56% of the answers. Furthermore, the days with the higher sales are from Monday to Friday with percentages between 17.91% and 19.28%, then this value drops to 8.26% during Saturday and Sunday and the time of the day with more clients is "noon" (44.57%).

It is interesting to note that the demand for products in Vila Mariana is similar to the demand in Itaquera. In this case, the most demanded products are "Milk, bread and derived products" in which at least 50.00% of the sample gave a score equal or higher to 9.50. Followed by "Soft drinks and juices" which at least 50.00% gave a score equal or higher to 9.00. In the third and fourth positions are "Vegetables/legumes/fruits" and "Sugar and sweets" which both obtained a median of 8.00. Finally once again "Canned goods" and "Cereal/grains" obtained the lowest medians of 5.00 and at least 25.00% of the interviewees gave a score lower than 4.00 as Table 26 shows.

Table 26 - Demand of products, perception of small retailers in Vila Mariana

Attributes	Mean	Mode	Q1	Md	Q3
Cereal/Grains	5.63	5.00	4.00	5.00	7.00
Vegetables/legumes/fruits	7.85	10.00	6.00	8.00	10.00
Canned goods	5.07	5.00	4.00	5.00	6.00
Alcohol and Cigarettes	7.09	10.00	5.00	8.00	10.00
Personal hygiene products	6.31	5.00	5.00	6.00	9.00
Milk, bread and derived products	8.48	10.00	7.00	9.50	10.00
Meat and eggs	7.03	7.00	6.00	7.00	8.00

Sugar and sweets	7.65	8.00	6.50	8.00	9.00
Soft drinks and juices	8.29	10.00	7.00	9.00	10.00
Cleaning products	6.69	6.00	5.00	6.00	9.00

4.2.2 Transportation

Block 2 describes the mean of transport that small retailers use to acquire the products for their store.

Itaquera

In Figure 10, it is possible to remark that most of the small retailers of Itaquera make use of "Cars" and "Pick-ups" to acquire the goods for their store, with 47.20% and 29.19% respectively. Followed by "Motorcycles" who received 13.63% of the votes. The option "None" received 6.49% of preference, it is important to remark that two interviewees indicated that they use a "Taxi/uber" to buy their products. This matches the stated by Zhang et al., (2017) which says that in the absence of formal distribution small retailers travel long distances to replenish their stores.

Vila Mariana

In the case of Vila Mariana, transportation means change drastically compared to Itaquera. In Figure 13 is possible to appreciate that 66.32% of the respondents selected "None", it is important to remark that these respondents indicated there is no need to use a vehicle since companies usually make deliveries in their district. In the case of the attribute, "Car" obtained 18.48% of the responses, followed by "Pick-up" with 8.70%.

Figure 10 - Mean of transportation for Small retailers in Itaquera and Vila Mariana
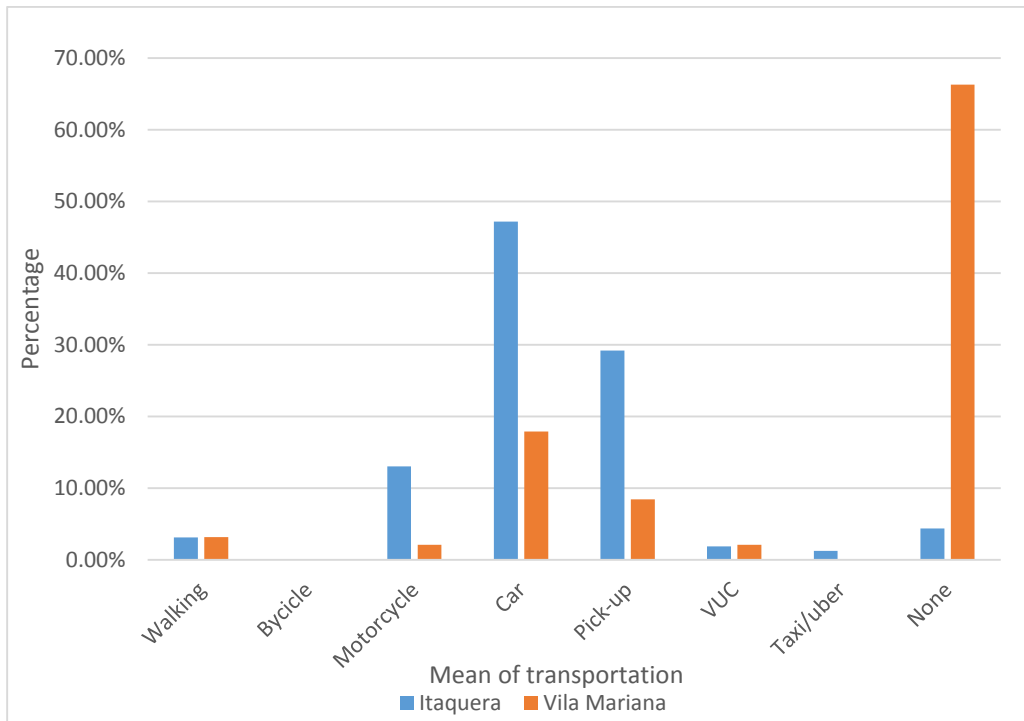
4.2.3 Collaboration, distributor deliveries

Block 3 aims to understand the distribution process for small retailers.

Small Retailers in Itaquera

In Itaquera, 60.39% of the small retailers indicated that they buy "Sugar and sweets" direct from a company or wholesaler, followed by "Soft drinks" with 53.89% of the responses. In contrast, "Canned products" and "Alcohol and cigarettes" got the lowest note with only 42.21% and 43.51% of the responses respectively.

In the case of the replenishment frequency of products, all the products are replenished one time per week. The products with the highest percentage are "Milk, bread and derived products" with 49.00% followed by "Meat and eggs" with 47.72%.

The results also showed that selling on-request products is not a popular practice, only 29.87% of the respondents indicated that they sell "Milk, bread and derived products" by demand, followed by "Meat and eggs" with 27.92% and "Vegetables and fruits" with 27.27%, the rest of the products received notes lower than 23%.

The most common time of the day for receiving products in Itaquera is during the "Morning", with 46.75% of the votes, followed by "Afternoon" with 18.18% of the votes. On the other hand, "Night" and "Early morning" got the least number of votes with 2.60% and 0.65% respectively. Similarly, the respondents indicated that they consider morning as the best time of the day for receiving goods, with 72.73% of the responses and "Afternoon" with 14.29%, while "Night" and "Early morning" got zero votes.

Furthermore, small retailers responded that the vehicles that companies use the most for delivering goods are "Trucks" with 51.95% of the responses. The vehicles "Car" and "Pick-up" obtained 18.83% and 13.64% of the responses each, while "VUC" obtained 6.49%, finally "Bicycle" obtained one vote.

The average delivery time of products is "24 hours" with 25.97%, followed by "48 hours" with 20.78%, on the other hand, the less common delivery time is "Other" with 9.74%, which means that some deliveries take more than 48 hours. Also, eight small retailers responded that they do not receive products from companies, and the majority of the small retailers responded that they do not make use of the "Loading/unloading bays" (81.17%) while they receive merchandise.

In terms of payment methods to the companies and wholesalers, the respondents indicated that they pay more with "Bill of exchange" representing 54.55% of the answers and "Money" with 35.06%.

In Table 27, it is possible to observe the attributes that small retailers in Itaquera consider when they buy from a company. According to the interviewees "Price", "Quality of a product" and "Variety of products" are the most important attributes, the three of them got medians of 9.00, 8.50, and 8.00 respectively. Besides, the three attributes mentioned above got the least disperse answers. On

the other hand, the attributes "Credit" and "Publicity/furnishing delivered by the company" received the lowest scores, and in which at least 25% of the respondents gave a score of 3.00 for "Credit" and 4.00 for "Publicity/furnishing delivered by the company". This corroborates with the study of Boulaksil and van Wijk, (2018) which states that suppliers do not offer credits to small retailers.

Table 27 - Attributes considered by small retailers in Itaquera

Attributes	Mean	Mode	Q1	Md	Q3
Proximity	6.79	10.00	5.00	7.00	9.00
Variety of products	7.97	10.00	7.00	8.00	10.00
Credit	6.04	10.00	3.00	7.00	9.00
Price	8.53	10.00	7.25	9.00	10.00
Promotions	6.94	10.00	5.00	8.00	10.00
Buying in small quantities	6.55	10.00	5.00	7.00	9.00
Business delivery	6.73	10.00	4.00	8.00	10.00
Business delivery timetables	6.67	10.00	5.00	7.00	9.00
A close relationship with the company	6.81	10.00	5.00	8.00	10.00
Publicity/furnishing delivered by the Company	6.29	10.00	4.25	7.00	9.00
Quality of the product	7.47	10.00	6.00	8.50	10.00
The popularity of the product	7.23	10.00	5.00	8.00	10.00

Small retailers in Vila Mariana

On the other hand, small retailers in Vila Mariana do not buy their products direct from another store, which means that stores in the TOP mostly receive products from companies. "Cereals/grains" represent the highest note with only 9.78%. In the case of the frequency for the replenishment of products, the small retailers in Vila Mariana did not want to respond to the questions; more than 82.60% of them left in blank the section. In the same way, 100% of the small retailers indicated that they do not sell products on demand.

The most common time of the day for receiving products in Vila Mariana is during the "Morning", with 65.22% of the votes and only 10.87% of them receive products in the "Early morning". Similarly, the respondents indicated that they consider morning also as the best time of the day for receiving goods, with 69.57% of the responses, and followed by "Early morning" with 14.13%. This coincides with the time windows imposed by the municipality of Sao Paulo.

Besides, small retailers responded that the vehicles that companies use the most for delivering goods are "VUCs" with 64.13% of the responses, which also coincides with the restrictions imposed on freight vehicles inside the mini-road ring in Sao Paulo. The average delivery time of products is within "24 hours" with 51.09%. Also, only 7.60% of the small retailers indicated that they make use of "Loading/unloading bays" while receiving the merchandise.

In terms of payment methods to the companies and wholesalers, the respondents indicated that they pay more with "Bill of exchange" representing 81.75% of the answers and "Money" with 9.78%.

Similar to the responses in Itaquera, the interviewees indicated that "Price" and "Quality" are the most important attributes. It is important to mention that almost 100% of the respondents gave a score of 10.00 to these attributes. Consequently, at least 50% of the sample gave scores of 10.00 to the attributes "Business delivery", "Close relationship with the company" and "Buying in small quantities". Finally, the attributes "Proximity" and "Publicity/furnishing delivered by the company" obtained the lowest scores. In the case of "Proximity at least 50% of the respondents gave a score lesser or equal to 0.5, while "Publicity/furnishing delivered by the company" obtained a median of 3.00 and 6.50 in the third quartile as Table 28 shows.

Table 28 - Attributes considered by small retailers in Vila Mariana

Attributes	Mean	Mode	Q1	Md	Q3
Proximity	3.05	0.00	0.00	0.50	5.00
Variety of products	7.44	10.00	5.50	8.00	10.00
Credit	5.67	10.00	2.00	6.50	9.00
Price	9.23	10.00	10.00	10.00	10.00

Attributes		Mean	Mode	Q1	Md	Q3
Promotions		7.27	10.00	5.00	9.00	10.00
Buying in small quantities		8.08	10.00	7.00	10.00	10.00
Business delivery		8.71	10.00	8.00	10.00	10.00
Business delivery timetables		6.94	10.00	5.00	8.00	10.00
A close relationship with the company		8.15	10.00	7.00	10.00	10.00
Publicity/furnishing delivered by the Company		3.48	0.00	0.00	3.00	6.50
Quality of the product		9.55	10.00	10.00	10.00	10.00
The popularity of the product		8.11	10.00	8.00	8.00	10.00

4.2.4 Infrastructure and services

Itaquera

Table 29 shows the descriptive analysis of the infrastructure and services for small retailers in Itaquera. The attributes with the higher notes in Itaquera are "Access to my store" followed by "Car traffic", which obtained a median of 8.00 and 7.00 respectively. In both attributes, at least 25.00% of the respondents gave a score equal or higher than 9.00. This means that for small retailers, their stores are located in a privileged location that facilitates their access, and the district does not present a high traffic flow. At the same time, the attributes with the lower notes are "Park the car on the street", "Street and sidewalks", "Loading and unloading zones" and "Respect for the transit laws" from which at least 50% of the interviewees gave a score lesser or equal to 5.00.

Table 29 - Infrastructure and services for Small retailers in Itaquera.

Attributes	Mean	Mode	Q1	Md	Q3
Robberies in the neighborhood	6.53	5.00	5.00	5.00	9.00
Cases of cargo theft	6.42	10.00	5.00	5.00	9.00
Public lighting	5.75	5.00	3.00	6.00	8.00
Loading/unloading zones	4.52	5.00	3.00	5.00	6.70
Park the car on the street	4.71	5.00	2.00	5.00	7.00

Attributes					
Presence of the police	5.39	8.00	3.00	5.50	8.00
Access to my store	6.74	10.00	5.00	8.00	9.00
Streets and sidewalks	4.77	0.00	2.00	5.00	7.00
Signings on the streets	4.90	5.00	3.00	5.00	8.00
Car traffic	6.65	10.00	5.00	7.00	9.00
Respect for the transit laws	4.77	5.00	3.00	5.00	7.00
Receiving fines	5.22	5.00	2.00	5.00	8.00

Vila Mariana

Table 30, shows the services of Vila Mariana, where the highest score was obtained by "Cases of cargo theft", in the point of view of the interviewees, cargo theft is rare since at least 50% of the sample gave a score equal or higher than 9.50. Following by the attributes "Access to my store", and "Signing of the streets" which obtained a median of 8.00 and a minimal dispersion in their values. This means that the stores are located in an area that facilitates access for clients and companies with clear signings. On the other hand, the attribute with the lowest score is "Loading and unloading zones", since at least 25% of the interviewees gave a score lowest or equal to 1.25 to the district. This is an interesting fact since even though Vila Mariana is a TOP district; the answers demonstrate that it still exists a lack of infrastructure focus on the delivery of goods.

Table 30 - Infrastructure and services for small retailers in Vila Mariana

Attributes	Mean	Mode	Q1	Md	Q3
Robberies in the neighborhood	5.98	5.00	4.00	6.00	8.00
Cases of cargo theft	7.84	10.00	6.00	9.50	10.00
Public lighting	6.70	8.00	5.00	7.00	8.00
Loading/unloading zones	4.25	5.00	1.25	5.00	6.00
Park the car on the street	5.30	5.00	3.00	5.00	8.00
Presence of the police	6.36	8.00	5.00	7.00	8.00
Access to my store	8.15	10.00	7.00	8.00	10.00
Streets and sidewalks	6.35	8.00	5.00	7.00	8.00
Signings on the streets	7.43	8.00	6.00	8.00	8.00

Car traffic	5.50	8.00	4.00	6.00	8.00
Respect for the transit laws	4.63	5.00	2.00	5.00	7.00
Receiving fines	5.45	5.00	5.00	5.00	7.00

4.2.5 Small retailers' crossed analysis

Crossed analysis of consumer behavior by type of retailer

In this part of the research, it was opted to analyze the different types of retailers, to understand if the consumers behave differently.

To understand clearly, Table 31 shows the options that obtained the highest scores in each type of retailer. Indeed, it is clear that consumers of each retailer have different habits. For example, 39.33% of the "Small retailers" consumers, 43.75% of the "Greengroceries" consumers, and 75.00% of the "Bars" consumers prefer to pay with "Cash".

In addition "Popular brands" are the best-selling items in "Small retailers" (55.71%), "Mini-markets" (46.27%), "Super/hypermarkets" (66.67%), "Butcheries" (22.73%), "Bakeries" (53.00%), "Bars" (67.67%) and "Drugstores" (63.16%).

Moreover "Morning" is one of the favorite times of the day for shopping in "Small retailers" (21.43%), "Mini-markets" (35.82%), "Greengroceries" (25.00%), "Butcheries" (31.82%) and "Bakeries" (31.58%). Finally, "Saturday and Sunday" are two of the most popular days for shopping in "Small retailers" (37.89%), "Mini-markets" (18.00%), "Super/hypermarkets" (50.00%), "Greengroceries" (33.33%), "Butcheries" (38.00%) and "Bars" (63.50%).

Table 31 - Consumer behavior by type of retailer

	Small retailer (%)		Mini-market (%)		Sup/hypermarket (%)	
Client payment method	**Cash**	**39.33**	**Debit**	**47.83**	**Debit**	**33.33**
	Debit	**34.83**	**Credit**	**29.3**	**Credit**	**33.33**
Time of the day with more clients	Night	22.86	Morning	35.82	Afternoon	66.67
	Morning	21.43	Night	20.9		
	All	21.43				
Best-selling products	**Popular brands**	**55.71**	**Popular brands**	**46.27**	**Popular brands**	**66.67**
Best-selling days	FRI	21.12	TUE	18.00	FRI	33.33
	SAT/SUN	57.89	FRI	18.50	SAT/SUN	50.00
			SAT/SUN	18.00		

	Greengrocery (%)		Butchery (%)		Bakery (%)	
Client payment method	**Cash**	**43.75**	**Debit**	**45.83**	**Debit**	**40.63**
	Debit	**37.50**				
Time of the day with more clients	Night	31.25	Morning	31.82	Morning	31.58
	Morning	25.00	Noon	40.91	Noon	42.11
Best-selling products	**Local products**	**37.50**	**Popular brands**	**22.73**	**Local products**	**53.00**
			Products I recommend	**22.73**		
Best-selling days	THU	15.38	THU	16.00	MON	17.24
	SAT/SUN	33.33	SAT/SUN	38.00	FRI	22.41

	Bar (%)		Drugstore (%)	
Client payment method	**Cash**	**75.00**	**Debit**	**42.42**
			Credit	**42.42**
Time of the day with more clients	Afternoon	67.67	Noon	68.42
Best-selling products	**Popular brands**	**67.67**	**Popular brands**	**63.16**
Best-selling days			TUE	18.89
	FRI	31.25	WED	18.89
	SAT/SUN	63.50	THU	18.89
			FRI	20.00

Crossed analysis of distribution and deliveries by type of retailer

Similarly, to the section above, the collaboration, distribution, and deliveries will be analyzed by type of retailer. As Table 32 shows, the most popular vehicle for shopping goods is "Car", according to "Small retailers" (49.57%), "Greengroceries" (37.50%), "Butcheries" (45.45%), and "Bars" (50.00%).

On the other hand, the most used vehicle by carriers is "Truck", according to "Small retailers" (51.43%), "Mini-markets" (37.31%), "Super/hypermarkets" (100.00%), "Greengroceries" (56.25%), "Bakeries" (52.63%) and "Drugstores" (36.84%). Besides, the most popular time of the day for receiving products is in the "Morning" as stated by "Small retailers" (52.86%), "Mini-markets" (58.21%), "Super/hypermarkets" (100.00%), "Greengroceries" (62.50%), "Butchery" (50.00%) and "Bakeries" (84.21%).

In the same way, the average delivery time after the retailer makes an order is "24 hours" as claimed by "Small retailers" (25.71%), "Mini-markets" (28.36%), "Butchery" (59.09%), "Bakeries" (61.36%) and "Drugstores" (78.95%). Finally, retailers prefer to pay with "Bank slips" according to "Small retailers" (45.71%), "Mini-markets" (50.75%), "Super/hypermarkets" (100.00%), and "Greengroceries" (68.75%), "Butcheries" (72.73%) and "Bakeries" (57.86%).

It is important to remark that almost half of the "Bars" (41.67%) indicated that they do not receive products from companies.

Table 32 - Distribution and deliveries by type of retailer

	Small retailer (%)		Mini-market (%)		Super/hypermarket (%)	
The vehicle used by the retailer	Car	**49.57**	None	**41.79**	None	66.70
Time of the day when the retailer receives products	Morning	52.86	Morning	58.21	Morning	100.00
The vehicle used by carriers	Truck	**51.43**	Truck	**37.31**	Truck	**100.00**
			VUC	**35.82**		
Average delivery time after the retailer made an order	24h	25.71	24h	28.36	48h	66.70
			48h	25.37		
Payment method	Bank slip	**45.71**	Bank slip	**50.75**	Bank slip	**100.00**
	Cash	**41.43**	Debit	**47.83**		
			Credit	29.3		

	Greengrocery (%)		Butchery (%)		Bakery (%)	
The vehicle used by the retailer	Car	**37.50**	Car	**45.45**	Truck	**36.84**
Time of the day when the retailer receive products	Morning	62.50	Morning	50.00	Morning	84.21
The vehicle used by carriers	Truck	**56.25**	VUC	**31.82**	Truck	**52.63**
			Car	**31.82**	VUC	**31.58**
Average delivery time after the retailer made an order	6h to 48h	75.00	24h	59.09	24h	61.36
Payment method	Bank slip	**68.75**	Bank slip	**72.73**	Bank slip	**57.86**

	Bar (%)		Drugstore (%)	
The vehicle used by the retailer	Car	**50.00**	None	**89.47**
Time of the day when the retailer receives products	None	41.67	Early morning	36.84
The vehicle used by carriers	None	**41.67**	VUC	**57.89**
			Truck	**36.84**
Average delivery time after the retailer made an order	None	41.67	24h	78.95
Payment method	Money	**75.00**	Central	**78.95**

4.3 Analysis of the carriers

4.3.1 Firm Profile

In the district of Itaquera, 24 carriers were interviewed; the average experience time is 8.45 years, and their most used vehicle is Trucks (54.17%), followed by Pick-up (20.83%), Van (12.50%) and VUC (12.50%).

Also, 25.00% of the drivers' merchandise comes from Itaquera, other 25.00% indicated that their merchandise comes from the SPMR in general, and 29.17% indicated that the origin of the merchandise comes from the east and north region of Sao Paulo in general. On the other hand, 29.16% of the carriers responded that the final destination of the merchandise is Itaquera, while 37.50% responded that the final destination is the east region of Sao Paulo and finally 33.33% indicated that is the SPMR in general as Table 33 shows.

Table 33 – Carriers' origin and destination of the merchandises

	Origin of the merchandise (%)	Destination of the merchandise (%)
Itaquera	6 (25.00%)	7 (29.16%)
East region	4 (16.67%)	9 (37.50%)
North region	3 (12.50%)	0 (0.00%)
SPMR	6 (25.00)	8 (33.33%)
State of SP	4 (16.67%)	0 (0.00%)
Another State	1 (4.17%)	0 (0.00%)
Total	24 (100.00%)	24 (100.00%)

Regarding the types of goods, 29.70% of the carriers deliver FMCG, followed by Beer (16.67%), Bread (12.50%), and Meat (12.50%) as Table 34 shows

Table 34 - Type of merchandise delivered

Type of merchandise	Carriers (%)
Bread	3 (12.50%)
Beer	4 (16.67%)
Meat	3 (12.50%)
Rice and Beans	1 (4.17%)
Greengroceries	2 (8.33%)
Eggs	1 (4.17%)
Water	2 (8.33%)
Bananas	1 (4.17%)
FMCG	7 (29.17%)
Total	24 (100.00%)

4.3.2 Delivery profile in the SPMR

In this section, the carriers were asked about the characteristics of the deliveries. It is interesting to remark that 50.00% of the carriers responded that business hours are the most frequent time for the deliveries to take place, while 33.33% indicated that the morning time and only 2.00% stated that the afternoon. Besides, 62.50% of the carriers do not receive the money for the goods, this is probably to reduce the risk of theft, and only 20.83% receive money while only 8.33% receive a bank slip or accept cards respectively. Finally, the average number of deliveries is 10.19 costumers per day and the days with the highest number of deliveries are Friday, followed by Thursday and Monday.

4.3.3 Issues referring to freight distribution

Due to the limited sample of carriers, it was opted to assign relevance values to the attributes with the highest and the lowest scores. Therefore, the highest attributes received a relevance score of "1" and the lowest attributes received a relevance score of "0". As a result, carriers gave interesting insights when they were asked about the attributes related to the freight distribution. First, the attribute with the highest score is "Vehicle Use" which obtained a mean of 8.33 and a median of 9.50, this means that at least 50% of the respondents gave a score equal or higher to the value of the median. Followed by "Delivery concentrated in the last week of each month" where at least 50% of the respondents gave a score equal or higher than 8.00 and at least 25% gave a score equal or higher than 9.00, which indicates that this type of problems rarely happens. Next, the attributes "Floods", "Flexibility for receiving the products in another hour" and "Sharing information with the final recipient" obtained similar values with at least 50% of the respondents giving a score equal or higher than 7.00 and in the case of "Floods," at least 25% of the respondents gave a score equal or higher than 9.00 in the district. As mentioned before all of these attributes received a relevance score of "1".

On the other hand, the attribute with the lowest value is "Condition of the streets and sidewalks", in the point of view of the carriers this part of the infrastructure in Itaquera is in deplorable conditions since at least 50 percent of them gave a score equal or lower than 1.00 in the scale. The same situation happens to "Drivers receive a lot of fines", where at least 50 percent of the carriers gave a score equal or lower than 1.50, which means that this is a common problem for carriers in the district. Other problems identified by carriers were "Park the car on the street" and "Drivers respect the transit laws" in these cases 75% percent of the carriers gave a score equal or less than 4.25 for transit laws and 4.00 for parking the car on the street. Finally the attributes "Security/risk areas", "Lack of suitable load/unloading areas", and "Suitable parking areas" obtained a median of 3.00 and at least 75% of the carriers gave a score equal or lesser than 5.00 from the carriers' perspective. As

mentioned before all of these attributes received a relevance score of "0" as Table 35 shows.

Table 35 - Freight distribution in the point of view of the carriers

Attributes	Relevance	Mean	Mode	Q1	Md	Q3
Traffic/Congestion		3.71	5.00	2.50	5.00	5.00
Lack of suitable load/unloading areas	0	3.33	0.00	0.75	3.00	5.00
Sharing information with the final recipient	1	6.75	7.00	6.00	7.00	8.00
Flexibility for receiving the products in another hour	1	6.46	5.00	5.00	7.00	8.00
Narrow streets to delivery		5.08	5.00	5.00	5.00	7.00
Security/risk areas	0	2.88	0.00	1.50	3.00	4.00
Floods	1	7.00	5.00	5.00	7.00	9.00
Suitable parking area		3.54	3.00	2.75	3.00	5.00
Queue to load/unload		5.13	5.00	3.00	5.00	7.25
Delivery concentrated in the last week of each month	1	6.83	10.00	5.00	8.00	9.00
Vehicle use	1	8.33	10.00	7.00	9.50	10.00
Park the car on the street	0	2.46	0.00	0.00	2.00	4.25
Public lightning		5.96	7.00	5.00	7.00	8.00
Stealing cases		4.42	0.00	1.75	4.00	7.25
Cargo theft		4.58	8.00	2.75	4.50	8.00
Condition of the streets and sidewalks	0	2.63	0.00	0.00	1.00	4.25
Signings on the streets		5.63	7.00	3.00	6.50	7.00
Drivers respect the transit laws	0	2.79	2.00	1.00	2.00	4.00
Drivers receive a lot of fines	0	2.42	0.00	0.00	1.50	4.250

Note: 0 = low relevance; 1 = high relevance

4.3.4 Carriers' crossed analysis

Freight distribution in the point of view of carriers from different regions

In this section, the freight distribution will be analyzed by comparing the point of view of carriers who are from the east region of Sao Paulo, with the point of view of carriers from other regions, who also make deliveries in the East region. This section aims to explore if the perception of the east region drivers is different from the rest of the carriers since Itaquera is located inside of the east region.

As Table 36 shows, carriers from the east region gave higher scores to the district of Itaquera. These carriers gave the higher scores to "Vehicle use", "Delivery concentrated in the last week of each month" and "Floods" with medians of 9.50, 8.50, and 8.00 respectively. In the case of "Delivery concentrated in the last week of the month" and "Floods," at least 25.00% of the respondents gave a score equal or higher than 9.00. In general, this means that carriers use their vehicles most of the time; they also make their deliveries on time and rarely see cases of floods in Itaquera.

Besides, the difference between the east region carriers and the rest of the region drivers is notable. In general, the east region medians were between 0.50 and 3.00 higher. As an example, at least 50.00% of the carriers from the east region gave a score equal or higher than 6.00 for "Stealing cases". On the contrary, at least 50.00% of the carriers from the rest of the regions gave a score equal or lesser than 3.00, which means they consider Itaquera more dangerous. Another example is "Signings on the streets" in which at least 50.00% of the respondents from the east region gave a score of 7.00, which in the case of the carriers from other regions the score was 5.50.

Finally, it exists some cases in which carriers from the other regions gave higher scores. It is important to remark that even though the scores were higher, the medians remained with negative values. Such is the case of "Drivers receive a lot of fines", "Suitable parking area", "Security/risky areas", "Lack of suitable load/unloading areas" which have medians of 2.00, 3.50, 3.50 and 3.00 respectively. The only exception to this rule was "Queue to load/unload" in which the other region carriers obtained a positive median that was higher than the median of the east region carriers. In this case, at least 50.00% of the respondents gave a score equal or higher than 6.50.

Table 36 - Freight distribution in the point of view of carriers from different regions

Attributes	Region	Mean	Mode	Q1	Md	Q3
Traffic/Congestion	**East region**	**4.20**	**5.00**	**5.00**	**5.00**	**5.00**
	Other regions	**3.36**	**5.00**	**1.50**	**3.00**	**5.00**
Lack of suitable load/unloading areas	East region	2.60	0.00	0.25	3.00	3.75
	Other regions	3.86	5.00	2.25	4.00	5.00
Sharing information with the final recipient	**East region**	**6.90**	**7.00**	**6.25**	**7.00**	**7.75**
	Other regions	**6.64**	**7.00**	**5.25**	**7.00**	**8.00**
Flexibility for receiving the products in another hour	East region	7.20	8.00	6.25	7.50	8.00
	Other regions	5.93	7.00	5.00	7.00	7.75
Narrow streets to delivery	**East region**	**4.80**	**5.00**	**5.00**	**5.00**	**5.75**
	Other regions	**5.29**	**5.00**	**5.00**	**5.00**	**7.00**
Security/risk areas	East region	2.50	0.00	0.50	3.00	4.00
	Other regions	3.14	0.00	2.00	3.50	4.75
Floods	**East region**	**7.50**	**8.00**	**6.25**	**8.00**	**9.00**
	Other regions	**6.64**	**5.00**	**5.00**	**6.50**	**8.75**
Suitable parking area	East region	3.40	3.00	2.25	3.00	4.75
	Other regions	3.64	3.00	3.00	3.50	5.00
Queue to load/unload	**East region**	**4.00**	**5.00**	**2.00**	**5.00**	**5.00**
	Other regions	**5.93**	**8.00**	**3.25**	**6.50**	**8.00**
Delivery concentrated in the last week of each month	East region	7.20	9.00	7.25	8.50	9.00
	Other regions	6.57	7.00	5.00	7.00	8.75
Vehicle use	**East region**	**8.50**	**10.00**	**7.00**	**9.50**	**10.00**
	Other regions	**8.21**	**10.00**	**7.25**	**9.00**	**10.00**
Park the car on the street	East region	2.70	5.00	1.00	2.50	4.50
	Other regions	2.29	0.00	0.00	2.00	3.75
Public lightning	**East region**	**6.90**	**8.00**	**6.25**	**7.00**	**8.00**
	Other regions	**5.29**	**5.00**	**3.50**	**5.00**	**7.00**

Stealing cases	East region	4.90	0.00	1.50	6.00	7.75
	Other regions	4.07	2.00	2.00	3.00	6.5
Cargo theft	**East region**	**5.00**	**8.00**	**3.00**	**5.00**	**8.00**
	Other regions	**4.29**	**3.00**	**2.25**	**4.00**	**5.75**
Condition of the streets and sidewalks	East region	3.10	0.00	0.00	1.50	5.75
	Other regions	2.29	0.00	0.25	1.00	3.00
Signings on the streets	**East region**	**6.70**	**7.00**	**7.00**	**7.00**	**7.75**
	Other regions	**4.86**	**3.00**	**3.00**	**5.50**	**6.75**
Drivers respect the transit laws	East region	3.80	5.00	1.25	4.00	5.00
	Other regions	2.07	2.00	1.00	2.00	2.75
Drivers receive a lot of fines	**East region**	**2.20**	**0.00**	**0.00**	**0.50**	**4.00**
	Other region	**2.57**	**0.00**	**1.00**	**2.00**	**4.5**

4.4 Crossed analysis of the perception of Itaquera by consumers and small retailers

In this section of the study are analyzed the questions related to the perception of Itaquera that are included in the consumers and small retailers' questionnaires.

As a result, Figure 11 shows the general perception of the district of Itaquera by consumers and small retailers. It is important to note that perceptions of the small retailers were slightly higher than the perceptions of the consumers.

For example, the attribute "Car traffic" has better reviews for small retailers (6.66) than for consumers (4.43). In addition, the attribute "Robberies" obtained reviews that are more positive from small retailers (6.54) than for consumers (3.64) who actually consider that the chance of being robbed is high. In the case of "Presence of the police", both actors gave a negative score, but small retailers (5.40) kept giving higher scores than the consumers (4.39).

Then the attribute "Park the car on the street" received low scores from both actors, small retailers gave 4.71, and consumers gave 3.46, the situation is similar to "Condition of the streets" which received 4.77 by the small retailers and 3.27 by

the consumers. Finally, the perception of "Public lighting" was similar for both actors, in which small retailers gave a score of 5.76, and consumers gave 5.11.

As mentioned above, small retailers gave higher scores related to the perception of Itaquera; this could be related to the fact that owners of the stores have a more positive impression of the place where they work.

**Figure 11 Correlation between Small retailers and Consumers in Itaquera**
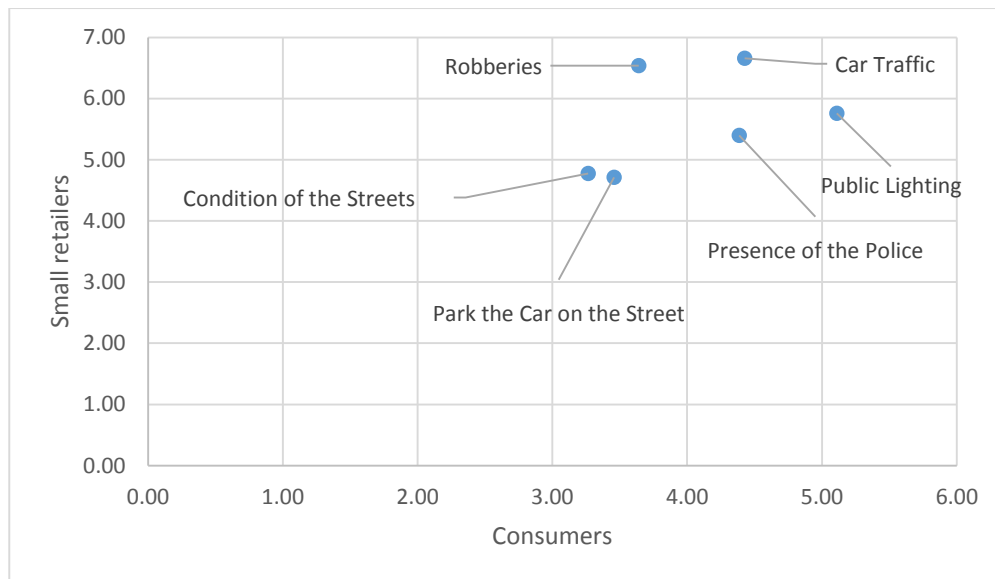
In the case of Vila Mariana, both actors gave higher scores compared to Itaquera. It is important to remark that the tendency of small retailers giving higher scores than the consumer persisted.

For example, small retailers (6.70) have a better perception of the attribute "Public lighting" than consumers (4.71). The same situation occurs to "Presence of the police" and "Condition of the streets" in which small retailers gave a score of 6.36 and 6.35 respectively, compared to the 4.22 and 4.24 of the consumers. In the attribute "Robberies", the difference between the scores was smaller, in which small retailers gave 5.98 compared to the 4.80 of the consumers.

Finally, the last two attributes "Car traffic" and "Parking the car on the street" did not show a significant difference between small retailers and consumers, which both gave scores under 5.70 as Figure 12 shows.

Figure 12 - Correlation between Small retailers and Consumers in Vila Mariana
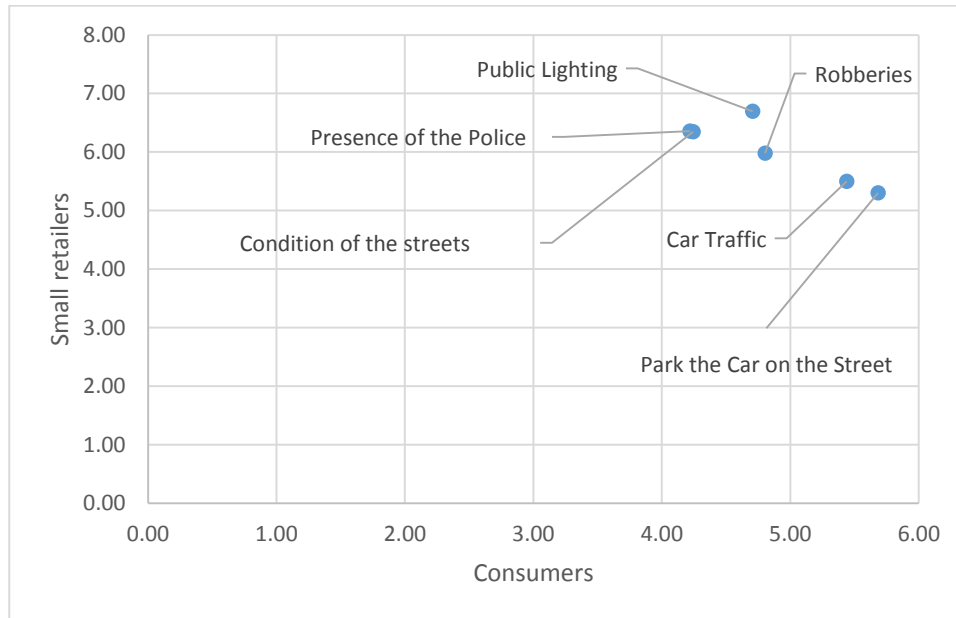

4.5 Summary of the results of the hypothesis

4.5.1 What are the buying habits of BOP and TOP consumers when they buy in a local store?

Hypothesis 1. (H1a) Consumers from both regions mostly buy their products from supermarkets and hypermarkets.

An important finding of this research is that the majority of the consumers from both districts indicated that they buy most of their FMCG products from Supermarkets and Hypermarkets. The percentage of the responses was almost equal, 78.89% in Itaquera while 78.05% in Vila Mariana. Compared to the 18.89% of the consumers in Itaquera who only buy in small retailers and 17.07% of the consumers in the case of Vila Mariana, as Figure 13 shows.

Figure 13 - Consumers preference in retailing
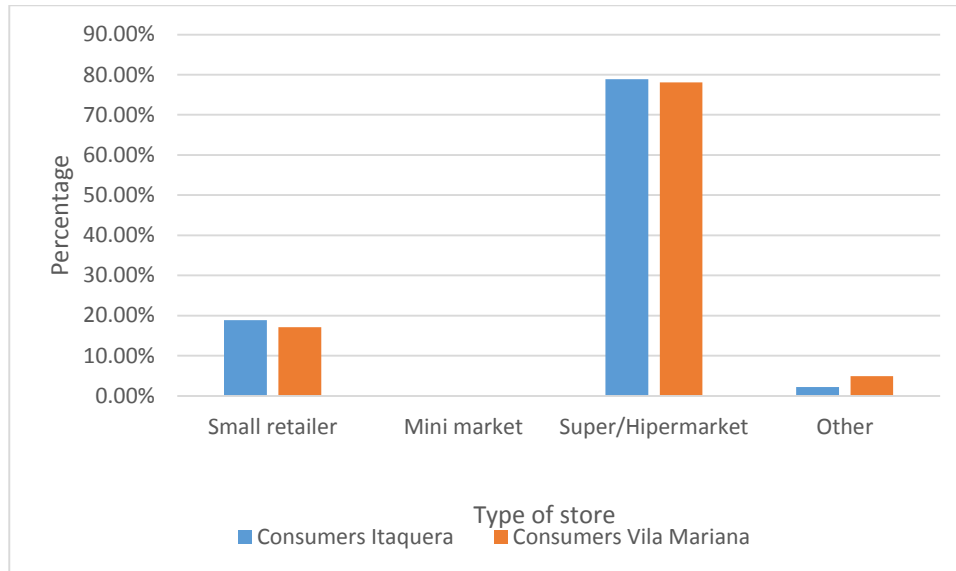
One of the major attributes that can influence this decision of choosing super/hypermarkets is transportation. Hence, 65.00% of the sample who buys in small retailers prefer to "Walk", on the other hand, 50.29% of the consumers who buy in super/hypermarkets prefer to use a "Car". Although both types of consumers, consider "Proximity" as the most important attribute for buying in a retailer.

In addition, 80.48% of the small retailers' consumers consider that prices in small retailers compensate the distance, in contrast to 49.71% super/hypermarket consumers'' who agree with that statement. This shows that half of the formal retailing consumers indeed think that the prices in small retailers are more expensive.

Finally, it is possible to conclude that the majority of the consumers from both regions buy most of their products from super/hypermarkets; and only one-fifth of the consumers buy from small retailers. This is in fact proven by previous studies since formal retailing in countries such as China and Brazil have gained more popularity than other developing countries (Fransoo & Blanco, 2012). Besides buying in supermarkets is a sign of social inclusion for BOP consumers (Barki & Parente, 2014; Amine & Lazzaoui, 2011).

Hypothesis 1. (H1b) For consumers at the TOP is more important the payment with a credit/debit card than for the consumers at the BOP who pay with cash.

The findings of this study show that for consumers in the BOP "Cash" is not their favorite payment method, instead 46.11% of the sample prefer to pay with "Debit card" and 31.11% prefer to pay with "Cash". It is important to note that in the small retailers' perspective, the use of "Debit card" and "Cash" by their clients is almost similar, resulting in values of 37.16% and 38.80% respectively, as Figure 14 shows.

In addition, this factor can be associated with the amount of money that consumers spend in small retailers. According to 67.22% of the consumers, they usually spend more than 20 reais every time they visit a small retailer; this result matches with 66.23% of the small retailers', which stated the same. In this point of view, consumers might be reluctant to carry higher amounts of money; therefore paying with cards is a safer option.

This result, in fact, does not agree with previous studies, for example, Banerjee and Duflo (2006) who stated that BOP consumers do not own a bank account. On the other side, small retailers still adapt to the needs of their clients (D'Andrea, Lopez-Aleman, et al., 2006). Nowadays, they are implementing the use of credit or debit card machines.

Figure 14 - Consumers payment methods in Itaquera
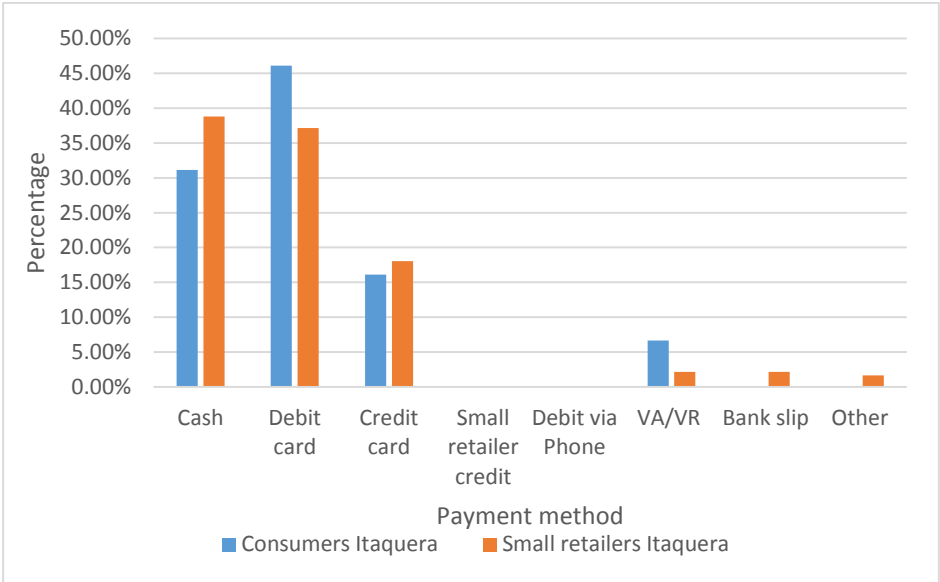
On the other hand, the results in Vila Mariana indicated that 58.54% of the consumers pay with "Credit card", followed by 36.59% who pay with "Debit Card", and only 2.44% pay with "Cash". These results are slightly different when compared to the small retailers' perception, which stated that 45.86% of their clients pay with "Debit card". However, the biggest mismatch is paying with "Credit card" which obtained 36.31% of the votes, and "Cash" which obtained 14.01%, as Figure 15 shows. Even though it exists a mismatch in the second favorite payment method, it is clear that both actors (Consumers and Small retailers) agree that they prefer to pay with cards.

Figure 15 - Consumers payment methods in Vila Mariana
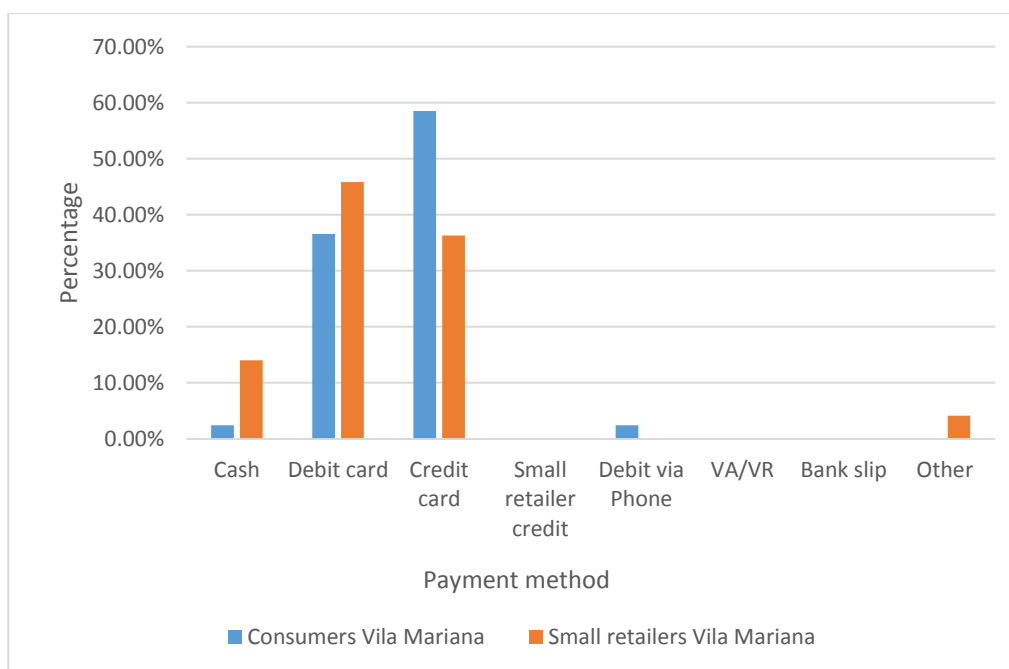
Hypothesis 1. (H1c) TOP consumers prefer attending small retailers during the week while BOP prefers attending small retailers during the weekend.

The results of this research indicate that consumers in Itaquera and Vila Mariana attend small retailers on different days of the week. Consumers from the region of Itaquera indicated that their favorite day for shopping is "Saturday and Sunday", according to 28.52% of the sample, followed by 18.75% of the consumers who chose "Friday". This, in fact, matches with the small retailers' perception, where 37.17% of the interviewees consider that "Saturday and Sunday" are the days where more clients attend their stores, followed by 19.47% who chose "Friday".

At the same time, this is supported by the carriers' opinions, since 28.81% of them stated that the day with the highest number of deliveries is "Friday". This response makes sense since small retailers need to replenish their stock one day prior to the days with the highest sales as Figure 16 shows.

To make this part of the research more exact we analyze the consumers' favorite time of the day for shopping in Itaquera's small retailers. According to consumers, they prefer to shop during the "Morning" (31.11%), "Evening" (30.00%), and "Night" (28.33%). This matches the small retailers' perception, which also indicated that "Morning" (22.73%), "Evening" (24.03%), and "Night" (23.38%) are the times of the day with more clients.

Figure 16 - Favorite day of the week for visiting a small retailer in Itaquera
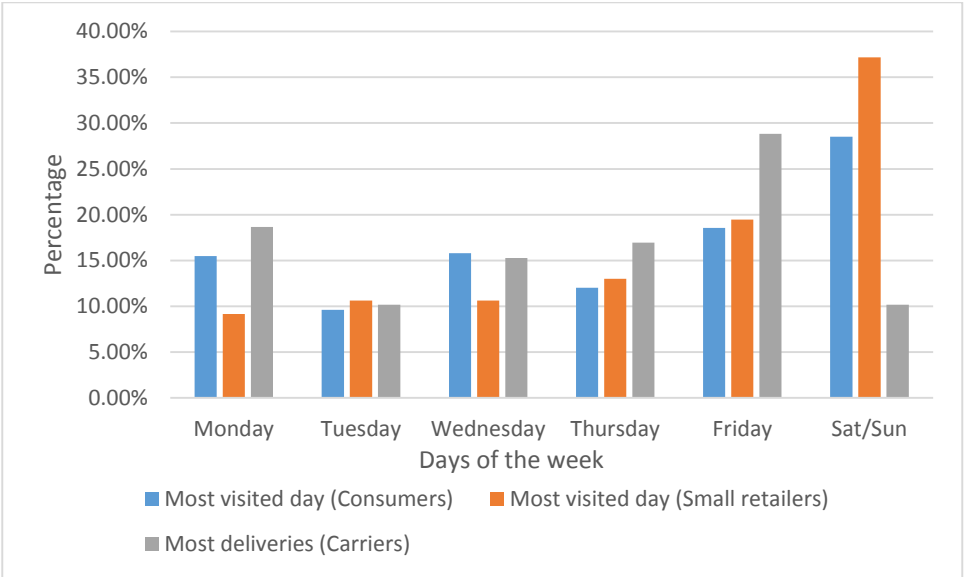
On the other hand, the situation of Vila Mariana is different, 23.61% of the consumers chose "Saturday and Sunday" as their favorite day for shopping in a small retailer, followed by "Wednesday" with 18.06%, as Figure 17 shows. However, from the perspective of the small retailers, the visits of the clients are stable from "Monday" to "Friday" with percentages between 17.91% and 19.28%, then this value drops to 8.26% during "Saturday and Sunday". Matter of fact, interviewing carries who deliver products to Vila Mariana can bring a complete insight regarding the demand of products in the district, and as a result, an answer that supports one of the statements made by the other actors.

Figure 17 - Favorite day of the week for visiting a small retailer in Vila Mariana
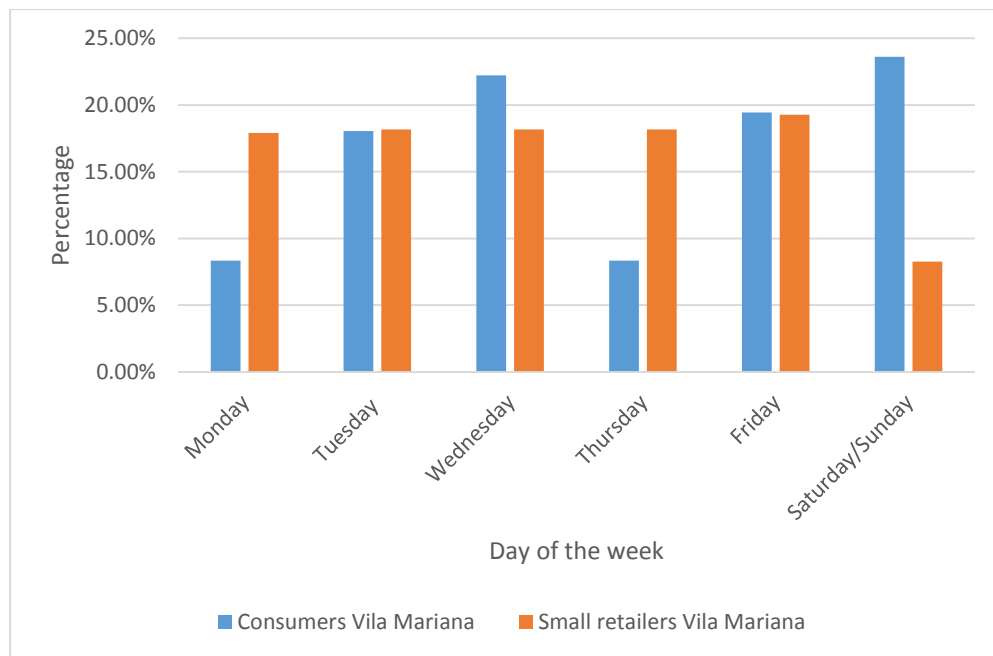
4.5.2 What are the characteristics of the reception of FMCG goods in both districts?

Hypothesis 2. (H2) Small retailers in TOP neighborhoods mostly receive their products from FMCG drivers while small retailers at the BOP use their own vehicles to obtain FMCG products.

The results of the research regarding the delivery of FMCG products show interesting insights regarding this process in the two regions. First 47.01% of the small retailers in the district of Itaquera stated that they use a "Car" to buy products for their store, followed by 28.47% who chose "Truck" and 11.92% who chose "Motorcycle" this means that more than two-thirds of the sample use a vehicle to buy goods.

It is important to note that when small retailers were told to indicate the FMCG products that they buy from another retailer, all the products received between 48.00% and 60.39% of the responses by the sample, as Table 37 shows. In other words, all the FMCG products are highly bought by small retailers in wholesalers

and small retailers use their vehicles to obtain these products. At the same time, this matches the stated by Zhang et al., (2017) who say that small retailers use their own vehicles to obtain products when services of formal distribution are not available.

Table 37 - Small retailer population in Itaquera who buy products in a wholesaler

Products bought in a wholesaler	(%) Population
Cereal/Grains	48.05
Vegetables/legumes/fruits	50.00
Canned foods	42.21
Alcohol and Cigarettes	43.51
Personal hygiene products	50.00
Milk, bread and derived products	48.05
Meat and eggs	44.16
Sugar and sweets	60.39
Soft drinks and juices	53.90
Cleaning products	48.70

On the other hand, in Vila Mariana, the results showed that small retailers mostly receive their products from carriers. In this case, 68.47% of the small retailers indicated that they do not use any kind of vehicles to obtain FMCG products, only 15.21% use a "Car" and 8.69% use a "Truck".

In addition, the percentage of small retailers who indicated that they buy certain FMCG products from a wholesaler is low, between 1.09% and 9.78% of the sample, as Table 38 shows.

Table 38 - Small retailer population in Vila Mariana who buys products in a wholesaler

Products bought in a wholesaler	(%) Population
Cereal/Grains	9.78
Vegetables/legumes/fruits	5.43
Canned foods	6.52
Alcohol and Cigarettes	1.09
Personal hygiene products	4.35
Milk, bread and derived products	8.70
Meat and eggs	4.35
Sugar and sweets	8.70
Soft drinks and juices	7.61
Cleaning products	4.35

Finally, important to remark that half of the small retailers in Itaquera mentioned that companies who make deliveries in their district mostly use "Trucks", while one-third of the small retailers in Vila Mariana indicated that companies use "VUCs" to make the deliveries. These responses make sense since Vila Mariana is located in the mini-road-ring and urban restrictions do not allow big vehicles to make deliveries.

4.5.3 **What are the main problems that hinder carriers for delivering goods to the district of Itaquera?**

Hypothesis 3. (H3) Carriers considered that the lack of infrastructure in the district of Itaquera is the major problem that hinders the deliveries.

For carriers, the research suggests that the lack of infrastructure in the district of Itaquera is the major problem that hinders the deliveries. The results showed five attributes related to infrastructure, security, and regulations. The infrastructural attributes are "Condition of the streets and sidewalks", "Lack of suitable loading/unloading areas", "Suitable parking areas" representing". Followed by the

security attributes "Park the car on the street", "Security/risk areas". Finally, the regulation attributes are "Drivers receive a lot of fines" and "Drivers respect the transit laws". The results match with the literature review in which condition of the streets (Dias et al., 2019), delivery security (Vieira et al., 2015), loading/unloading zones (Muñuzuri et al., 2017) are major problems for the distribution of goods.

5. CONCLUSION

This study demonstrated that urban logistics act differently in BOP and TOP regions. This is due to the influence that the actors have on this process. The infrastructure and economical levels of each region make the consumers behave differently, regarding payment methods, type of products they buy, days for shopping which are factors that have a strong influence on the delivery of products. For small retailers the situation is similar, BOP regions have a stronger presence of informal retailers, which operate in an individual and less organized way, this type of retailer demonstrates that they barely rely on distributors for obtaining FMCG. On the other hand, small retailers in TOP regions are more organized and formal retailers, which rely on distributors for obtaining almost all of their products. In addition, the infrastructure and services do also play a major role in the delivery of FMCG, thus governments should take into account those two factors for creating cities more adapted to the deliveries of goods.

At the same time, this research responded the three objectives of research. First, the results showed that consumers form both regions prefer to buy products in super/hypermarkets rather than small retailers. In addition, BOP consumers prefer to pay with cash and debit cards while TOP consumers prefer to pay with debit and credit cards. Finally, for BOP consumers and small retailers consider that the day with more activity in the small retailers is during the weekend. However, TOP consumers and small retailers did not coincide in the favorite days for shopping and days with more sales.

For the second objective showed that indeed, BOP small retailers use their own vehicles to buy FMCG products for their store, while TOP small retailers receive most of their products from companies or wholesalers who make deliveries.

The third and last objective showed that in the BOP carriers' perspective the major problems that hinder the deliveries are related to the infrastructural, security and urban regulation such as "Condition of the streets", "Security/risk areas" and "Drivers receive a lot of fines" among others.

Although the objectives of the research were responded, there are limitations related to this study:

- First, is the size of the sample of carriers interviewed in Itaquera, even though the collection of carriers was made in-loco, the size of the sample remains small to proceed with more advance static analyses, in addition to collecting responses from carriers in Vila Mariana in order to compare results.
- Secondly, the application of multivariate statistical analyses to identify stronger correlations between variables.
- Thirdly, increasing the number of responses from consumers in Vila Mariana in order to obtain a similar amount of responses than the ones obtained in Itaquera.

Moreover, it was possible to identify that the perceptions related to the urban logistics of the stakeholders are different in the two districts. On one hand, consumers and small retailers of Itaquera gave higher scores to infrastructural attributes such as "Public lighting", "Public transportation" and "Traffic". In contrast, they gave negative scores to attributes related to the security such as "Park the car on the street", "Stealing cases", "Robberies", and infrastructural attributes such as "loading and unloading zones" and "condition of the street and sidewalks". On the other hand, the consumers and small retailers of Vila Mariana gave positive scores to security attributes offered in the district, such as "Presence of the police", "Cargo theft", "Walk on the street" and "Park the car on the street". However, they do also

consider that the district does not possess enough infrastructure such as "Public lighting", "Loading and unloading zones" and "Condition of the streets" which can hinder the deliveries of products.

The results showed can help to ameliorate public policies related to urban restrictions as well as improving the infrastructure and security of BOP regions. This study can be applied to other megacities with similar characteristics in Latin-American such as Mexico City or smaller cities such as Buenos Aires or Bogotá. This can help governments and companies to identify the major challenges in TOP and TOP regions of the cities, and as a result, improving the deliveries of products and the quality of life of their residents.

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Annex one. Consumer Questionnaire

Age:			
Sex:			
Occupation:			
Where do you live:	In the neighborhood	Close to the neighborhood	Far to the neighborhood

Block 1 Consumer behavior

1. Answer the questions with respect to the following products.

a) Which of these products do you usually buy in a small retailer?

b) Mark the weekly frequency for buying these products in a small retailer.

c) Which of these products do you usually buy in another type of store?

		A	B	C
	Cereal/Grains			
	Vegetables/legumes/fruits			
	Canned foods			
	Alcohol and Cigarettes			
	Personal hygiene products			
	Milk, bread and derived products			
	Meat and eggs			
	Sugar and sweets			
	Soft drinks and juices			
	Cleaning products			

2. Rate from 0 to 10 the reasons why you buy products from a small retailer. Zero means that you do not consider the criteria important and 10 means that you consider the criteria important.

	Proximity		Buying in small quantities
	Variety of products		Home delivery
	Credit		Opening hours
	Price		A close relationship with the owner
	Paying with credit or debit card		Buy what you forgot while shopping
	Quality of the products		Products popularity
	Promotions		Buying by order

3. What is the biggest obstacle that could usually stop you from buying in a small retailer?

	Not having the product that you are looking for		Not having a credit or a debit card terminal
	Not having the brand that you are looking for		Not having the product in the size that you are looking for

4. How much money do you usually spend when you visit your favorite small retailer.

	0-5 reais		20-30 reais
	5-10 reais		30-50reais
	10-20 reais		Other quantity:

5. Which of the following payment methods do you use the most while shopping in a small retailer?

Cash	Debit card	Credit card	small retailer credit	Debit via Phone	Other:

6. Do you think that goods prices in a small retailer compensate for the proximity to your household?

	Yes		No		I do not have another option

7. Where do you usually buy most of your goods?

	small retailer		Hypermarket (Carrefour, Wal-Mart, Atacadão)
	Convenience store 24/7		Another
	Supermarket (Dia, Extra, Mini extra)		

8. In how many small retailers do you usually buy your groceries?

	1		3
	2		Another

9. How many times per day would you usually visit a small retailer to buy goods?

	One time per day		Between 4 and 5 times per day
	Between 1 and 3 times per day		More than 5 times per day

10. In which time of the Day do you usually buy at a small retailer?

Morning	Noon	Afternoon	Night	Early morning	Anytime

11. Mark the days of the week that you prefer for buying at a small retailer.

	Monday		Tuesday
	Wednesday		Thursday
	Friday		Saturday/Sunday

Block 2 Transportation and carrying

12. How do you usually carry the goods that you bought in a small retailer?

	Plastic bags offered by the small retailer		Backpack
	Cardboard box		Market bag
	Shopping cart		By hand

13. Which means of transport do you usually use when you buy your groceries?

	Walk		Taxi or Uber
	Bicycle		Motorcycle
	Public transportation		Car or truck

Block 3 Infrastructure and services

14. Mark if you agree with the following sentences about your community.

	Park the car on the street	
Unsafe	0 1 2 3 4 5 6 7 8 9 10	Safe
	Police presence	
Not much	0 1 2 3 4 5 6 7 8 9 10	A lot
	Condition of the streets and sidewalks	
Awful	0 1 2 3 4 5 6 7 8 9 10	Excellent
	Walk on the streets	
Unsafe	0 1 2 3 4 5 6 7 8 9 10	Safe
	Car traffic	
Awful	0 1 2 3 4 5 6 7 8 9 10	Excellent
	Public transportation	
Awful	0 1 2 3 4 5 6 7 8 9 10	Excellent
	Public lighting	
Awful	0 1 2 3 4 5 6 7 8 9 10	Excellent
	Stealing cases	
A lot	0 1 2 3 4 5 6 7 8 9 10	Not much
	Robberies	
A lot	0 1 2 3 4 5 6 7 8 9 10	Not much

15. Rate from 0 to 10 the following services in your community. Zero means that the service is bad and 10 means that the service is excellent.

Electricity		Drinking water	
Sewage		Security	
Schools		Hospitals and medical centers	
Parks		Streets	
Community centers		Churches	
Landline		Internet	
Cable TV		Gas pipelines	
Postal services		Trash collection	

16. How do you consider the prices that you pay for these services in your community?

High	Medium	Low

Annex two. Small retailer Questionnaire

Block 1 Consumer behavior

1. Which of the following payment methods do your clients use the most?

Cash	Debit card	Credit card	Bank slip	Debit via Phone	Other:

2. Which time of the Day does your store has more clients?

Morning	Noon	Afternoon	Night	Anytime

3. Which of the following products have more demand in your store?

Popular brands	Local products	Cheapest products	The products that you recommend

4. The average number of clients per day

5. The average amount of money spent by the clients

6. Days with the highest sales

Mon	TUE	WEN	THR	FRY	SAT	Sun

Block 2 Transportation

7. Which means of transport do you usually use when you buy products for your store?

Walking	Bicycle	Motorcycle	Car	Pick-up	VUC	Other:

Block 3 Collaboration, distributor deliveries, and demand

8. Consider the following questions concerning the products listed below.
a) Which of the following products do you usually buy direct from a company, on your own, or in another store?
b) What is the replenishment frequency for these products?
c) Which products do you sell by order?
d) Rate from 0 to 10 the demand for the products. Zero means that there is low and 10 means that the demand is high.

		A	B	C	D
	Cereal/Grains				
	Vegetables/legumes/fruits				
	Canned foods				
	Alcohol and Cigarettes				
	Personal hygiene products				
	Milk, bread and derived products				
	Meat and eggs				
	Sugar and sweets				
	Soft drinks and juices				
	Cleaning products				

9. Which time of the Day do you usually receive products?

Morning	Noon	Afternoon	Night	Early morning	All of them

10. Which time of the Day do you consider the best for receiving products?

Morning	Noon	Afternoon	Night	Early morning	All of them

11. Which transportation method do the companies usually use to deliver their products?

VUC	Bicycle	Motorcycle	Pick-up	Car	Trailer	Other:

12. Rate from 0 to 10 the reasons why you buy products from a company or wholesaler.

	Proximity		Business delivery
	Variety of products		Business delivery timetables
	Credit		A close relationship with the company
	Price		Publicity/furnishing deliver by the company
	Promotions		Quality of the product
	Buying in small quantities		The popularity of the product

13. What is the average delivery time (in hours), after you made an order from a company or wholesaler?

6	12	24	36	48	Other:

14. Which of the following payment methods do you use the most when you buy products from companies?

Cash	Debit card	Credit card	Bank slip	Debit via Phone	Other:

15. Do you receive night deliveries? If not, what are the reasons?

16. Number of staff members in the store

17. What are the biggest problems while receiving products?

18. Do you use loading/unloading bays?

Block 4 Infrastructure and services

19. Mark if you agree with the following sentences:

	Robberies in the neighborhood	
A lot	0 1 2 3 4 5 6 7 8 9 10	No much
	Cases of cargo theft	
A lot	0 1 2 3 4 5 6 7 8 9 10	Not much
	Public lighting	
Awful	0 1 2 3 4 5 6 7 8 9 10	Excellent
	Loading/unloading zones	
Not too many	0 1 2 3 4 5 6 7 8 9 10	A lot
	Park the car on the street	
Unsafe	0 1 2 3 4 5 6 7 8 9 10	Safe
	Presence of the police	
Not much	0 1 2 3 4 5 6 7 8 9 10	A lot
	Access to my store	
Difficult	0 1 2 3 4 5 6 7 8 9 10	Easy
	Streets and sidewalks	
Awful	0 1 2 3 4 5 6 7 8 9 10	Excellent
	Signings on the streets	
Awful	0 1 2 3 4 5 6 7 8 9 10	Excellent
	Car traffic	
Awful	0 1 2 3 4 5 6 7 8 9 10	Excellent
	Respect for the transit laws	
No one respects	0 1 2 3 4 5 6 7 8 9 10	Everyone respect
	Receiving fines	
It is common	0 1 2 3 4 5 6 7 8 9 10	It is not common

Annex three. Carrier Questionnaire

RESEARCH QUESTIONNAIRE

The academic research aims to highlight the main problems regarding the freight distribution inside the regions of Itaquera and Vila Mariana, districts that make part of the city of São Paulo. This research is developed by Héctor Ramírez[1] a master student who is enrolled in the Pos-graduate program of Industrial Engineering at UFSCar under the advice of Professor José Geraldo Vidal Vieira[2]. The main objective of this research is to create a document that explores the perceptions of the actors involved in the delivery of FMCG, maintaining the identity of the respondents and the companies in secret.

PART 1 – FIRM PROFILE

Experience time in the position:	
Region	
Economic activity	
Type of vehicle	

PART 2 – DEVILERY PROFILE IN THE SPMR

1. Which time of the Day do you usually deliver products?

Morning	Noon	Afternoon	Night	Early morning	All of them

2. During the delivery, which method of payment does the clients use?

I do not receive payments	Cash	Debit card	Credit card	Bank slip	Debit via Phone	Other:

3. Days with the highest number of deliveries

Mon	TUE	WEN	THR	FRY	SAT	Sun

4. What is the average number of retailers that you serve daily?

5. What is the daily volume of deliveries by vehicle?

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PART 3 – ISSUES REFERRING TO FREIGHT DISTRIBUTION IN SP

6. The following issues are related to freight distribution in SP. Please indicate your agreement level in each one: Level of Agreement: 0 is a negative idea and 10 is a positive idea.

	Traffic/Congestion		
Awful	0 1 2 3 4 5 6 7 8 9 10		**Excellent**
	Lack of suitable load/unloading areas		
Not many	0 1 2 3 4 5 6 7 8 9 10		**A lot**
	Sharing information with the final recipient		
Awful	0 1 2 3 4 5 6 7 8 9 10		**Excellent**
	Flexibility for receiving the products in another hour		
Not much	0 1 2 3 4 5 6 7 8 9 10		**A lot**
	Narrow streets to delivery		
Narrow	0 1 2 3 4 5 6 7 8 9 10		**Wide**
	Security/risk areas		
Insecure	0 1 2 3 4 5 6 7 8 9 10		**Secure**
	Floods		
A lot	0 1 2 3 4 5 6 7 8 9 10		**Not many**
	Suitable parking area		
Not many	0 1 2 3 4 5 6 7 8 9 10		**A lot**
	Queue to load/unload		
Long	0 1 2 3 4 5 6 7 8 9 10		**Short**
	Delivery concentrated in the last week of each month		
A lot	0 1 2 3 4 5 6 7 8 9 10		**Not much**
	Vehicle use		
Low	0 1 2 3 4 5 6 7 8 9 10		**High**
	Park the car on the street		
Unsafe	0 1 2 3 4 5 6 7 8 9 10		**Safe**
	Public lighting		
Awful	0 1 2 3 4 5 6 7 8 9 10		**Excellent**
	Stealing cases		
A lot	0 1 2 3 4 5 6 7 8 9 10		**Not many**
	Robberies		
A lot	0 1 2 3 4 5 6 7 8 9 10		**Not many**
	Condition of the streets and sidewalks		
Awful	0 1 2 3 4 5 6 7 8 9 10		**Excellent**
	Signings on the streets		
Awful	0 1 2 3 4 5 6 7 8 9 10		**Excellent**
	Drivers respect the transit laws		
Not much	0 1 2 3 4 5 6 7 8 9 10		**A lot**
	Drivers receive a lot of fines		
A lot	0 1 2 3 4 5 6 7 8 9 10		**Not much**