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Analysis of gender inequalities in Public transport services in Lisbon and policies to mitigate them

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Master of Science in Business Administration

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BUSINESS
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Department of Marketing, Strategy and Operations

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Sumário

O cada vez maior recurso aos transportes públicos reverte-se de uma grande importância devido a questões relacionadas com a sustentabilidade social e o bem-estar. A oferta de transportes públicos é considerada uma alternativa para muitas destas pessoas para se deslocarem aos mais diversos locais para as mais diversas finalidades no seu dia-a-dia. As perceções que as pessoas têm do transporte público e das viagens associadas a este pode ser negativamente influenciada pelos fenómenos da congestão e do *overcrowding*, podem levar a diversos constrangimentos bem sérios como chegar tarde a um compromisso importante num determinado lugar e afetar negativamente a sua experiência mesmo no decorrer da viagem, levando a que as pessoas optem pelo transporte privado ou plataformas como a Uber. Esta dissertação tem como objetivo identificar factores que são responsáveis por desigualdades de género verificadas no sector do transporte público e medidas que podem mitigar essas desigualdades. Um estudo teve lugar na área metropolitana de Lisboa e 250 respostas foram obtidas. A informação foi analisada com metodos estatísticos paramétricos e não paramétricos. Uma comparação entre os utilizadores de transporte público e privado teve lugar e as áreas que deviam ser as prioridades dos operadores de transporte público na área de Lisboa foram identificadas. A comparação principal deste estudo é que as perceções de segurança variam entre homens e mulheres quer nos/as utilizadores/as de transporte público, quer nos utilizadores/as de transporte privado e que algumas mudanças na operação do transporte público podem aumentar o sentimento de segurança do sexo feminino.

Palavras-chave: transporte público, experiência na mobilidade, satisfação com a viagem, perceções dos passageiros, desigualdade de género

Abstract

Nowadays the increasing use of public transport (bus, subway, and suburban trains) is of great importance due to issues related to the social sustainability and personal well-being. Public transportation is considered an alternative for many of these people to dislocate to several places for several purposes in their daily routine (work, college/school, leisure and so on). The perceptions that the people have on public transportation and its journey can be negatively influenced by the phenomena of the congestion and overcrowding, which can lead to very serious constraints as being late for an important commitment in a certain place and even negatively affect their experience during the trip, leading that the people choose private transportation and transportation platforms like Uber, mytaxi, Cabify, among others. This dissertation aims to identify factors that are responsible for gender inequalities verified in the sector of public transportation and measures that can mitigate these inequalities. A study took place in the Metropolitan Area of Lisbon and 250 replies were collected. The data was analysed with parametric and non-parametric statistic methods. A comparison among the users of public and private transport takes place and the areas that should be the priorities of the operators of public transport in Lisbon area are identified. The main conclusion of this study is that security perceptions vary among men and women both in private and public transport users and that some changes in the operation of public transport can increase the feeling of security to women.

Key words: public transport, mobility experience, trip satisfaction, passenger perceptions, gender inequality

JEL Classification: M1 - Business Administration, R41 - Transportation: Demand, Supply, and Congestion, R42 - Transportation Planning, D63 - Equity, Justice, Inequality, and Other Normative Criteria and Measurement

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1- Introduction

Nowadays that technological innovations appear, it is important to central governments, local authorities and public transportation operators to acquire external information crucial to the local implementation of policies that could improve the life quality of their citizens, since "*organizations explore the environment with the purpose of understanding external factors*" (Choo, 1998).

Mobility is an important aspect in the life of a city. Public transport gives its regular customers several benefits such as increasing their quality of life, in general, giving them quick access to new opportunities of work, an increased mobility for different purposes and no concerns about the maintenance of the private car or traffic jams, despite the negative aspects such as delays, variability of intervals between the trains/buses or ferries, insecurity issues, crowding and cleaning. Many factors may influence the perceptions of men and women and their satisfaction with public transport.

This master's dissertation focuses on public transport services for inclusive mobility due to the increasing importance of public transport as a sustainable mean of transport in great urban areas such as Lisbon. Customer's satisfaction with the service provided is important because several factors which are related to reliability, security and comfort could bring more or less customers to public transport providers stimulating a country's economy both in public sector (State) and in the private sector (PT providers).

The approach followed in this thesis counts for inequalities between men and women in public transport and measures that have already been taken. The issues related to these inequalities will be explored in the literature review, since they have an impact on women's quality of life and consequences on the socio-economic development of a certain country. Mobility inequalities still seem unknown to the public because they are poorly studied despite several policies have already been taken by local/central governments.

1.2- Thesis objectives

This dissertation focuses on two themes that will be developed and studied in detail through the next chapters: the customer's satisfaction regarding public transportation and the factors that contribute to a more inclusive mobility of transportation considering security aspects.

The sub-objectives of this dissertation are summarizing as follows:

1) Evaluate how the trip perception and experience is viewed by the Public Transportation female

users in Lisbon relating them with performance areas.

2) Evaluate how transport operators could improve the service in general and especially for the transport experience of women

3) Assess the way the socio-economic status and personal motivations (for example, their trip purpose) affect their journey perception by:

a) Relating personal characteristics to trip satisfaction.

b) Establishing a relationship between the individual motivations, as well as positive/negative experiences that PT users faced with the current conditions of the public transport offer in the Portuguese capital.

4) Recognize and test the gender inequalities between men and women in the use of public transport.

5) Assess transport solutions that can potentially increase both customers satisfaction and measures/suggestions to mitigate the issue of gender inequality in public transportation.

1.3- Methodology

In sum, this dissertation has the ultimate propose of gender inequalities in transport and solutions that can potentially increase both customers satisfaction and mitigate the issue of gender inequality in public transportation. In order to reach the objectives, the next step is to proceed to the reading of literature regarding past works towards the factors that lead to customer's satisfaction alongside with causes responsible for inequalities verified in the domain of public transportation, challenges towards a gender-equality in this issue, and policies that have already been implemented by several authorities (local, central governments, public transportation providers and other important institutions).

Previous research will be studied to identify the aspects that influence satisfaction as well as measures taken by several entities to promote a more inclusive mobility between men and women which will give the theoretical support to the methodology that will be applied in order to study these themes. Then in the methodology part, it will focus on the method that will be used to obtain the user's opinion regarding several factors that are relevant to their experience in public transportation and evaluate their opinion regarding the measures that have already been implemented in the past and what is needed to improve these measures in order to assure a more inclusive and sustainable mobility between men and women in urban and rural context. The

analysis will take place through statistical analysis and the application of parametric and non-parametric tests.

1.4- Thesis structure

In the next chapter, the literature will be reviewed and studies associated to this theme will be used to formulate several hypotheses that can accomplish our defined objectives. Next in, in Chapter 3, the methodology to be used will be defined to explore these issues. Then in the analysis and discussion of the results (Chapter 4), a critical assessment of the results that we obtained using the methodology will be conducted. At the end, future recommendations for studies regarding the public transportation thematic will be presented.

2- Literature Review

The following review of literature is essential and has the objective of getting a better awareness and knowledge of the two main themes of this work. It will recognize the factors that are responsible for the customers satisfaction towards public transportation, the causes that lead to a gendered mobility in the public transport and its importance to the users of public transportation. It will identify the policies that have already been implemented, assess if their effect is being noticed by the usual/temporary users of public transportation and suggest new solutions towards these issues regarding urban mobility.

2.1- Factors that influence passenger satisfaction with public transportation

In the first part of this literature review, the factors that influence passenger satisfaction with public transportation modules will be presented. The concepts of customer satisfaction and travel satisfaction, among others are approached. Customer satisfaction is the "*extent to which service delivery fulfils customer's expectations",* according to Morfoulaki (2007), galvanising individual attitudes towards PT motivating the choice of a transport platform for small distances and trips in urban context.

Travel satisfaction is the complete level of fulfilment related to the traveller's expectations and the result of cumulative and isolated events in the trip. The travel time is one of the most nuclear elements that conditions a lot of the passenger's opinions about the quality of the public transport provided by PT operators like Carris, Metropolitano de Lisboa, for example.

The total travel time comprises *"all supplementary travel times between the origin and destination such as wait time, walking time, etc", according to* Meng et al,2018, influenced by several factors such as crowding, bad weather conditions among others. These factors are responsible for a negative perception of waiting time, which lead to the concept of reliability. In the survey of Meng et al (2018), data was obtained by an "*accompanied survey by following the respondent from origin to destination*" to make sure that the respondent is comfortable with all the trip stages.

The respondents were selected by the surveyors from their closest contacts (friends and family) or random people around public transport stations. The information obtained in the process of the trip was concerned about the "*trip start and end time, date, weather, location, trip purpose and facility usage in the trip*" and also socio-demographic aspects like the age, gender and the occupation of the respondents. The survey had taken place from December 2015 to

February 2016, being collected a total of 437 surveys/available trips.

From this sample, were obtained "*316 trips with 1 transfer, 109 trips with 2 times transfer and 12 with 3 times transfer", according to* Meng et al (2018), being the first two used considered for the data analysis and model construction, using the linear regression model, because the results of the latter option are residual and consequently not statistical relevant for the study.

In order to verify the existence of differences between "*the actual and perceived travel time for walking, waiting, and in-vehicle time",* it was used a series of paired T-tests, being the null hypothesis that statistically that "*there are no difference between the actual travel time and perceived travel time*" , according to Meng et al (2018) applying to all travel time components while doing the public transport trip.

Associated to the total travel time there is the concept of Value of Time, which is considered by Boucasse & Lapparent (2019) as the "*qualitative perception of the travel time due to the activities conducted during the travel or the duration of the trip*", such as reading, listen to music, working/studying in the PC, surfing in the web or simply, resting during a trip or less or more duration in a Public transport. To investigate the heterogeneity regarding the value of time, a model based on the variables that feature the three main aspects of perceived comfort regarding the travel made by public transport was used. The considered aspects were the observed time in interurban public transport, the "*feelings experienced during journeys made by public transport*" the Perceived Behavioural Control (PBC) towards the usage of interurban public transportation.

The first factor recognized that increased the value of time as perceived by the public transportation user is the comfort which has the effect of reducing the stress of , literally run to change to another subway line for example, the quality of the materials used in the seats and its quantity in order to reduce stress, frustration and even, anger of the passengers.

Comfort, as a matter of fact, is a wider and complex concept that can be considered according the following features/variables which consist in the following: "*availability and/or the quality of infrastructures (seats, wireless connections, noise levels, cleanliness*)", according to Boucasse & Lapparent (2019). The comfort is the ultimate factor of the customer satisfaction in what concerns to the Maslow pyramid applied to the customer satisfaction with the public transportation presented in Allen et al (2019), which will be more employed lately in this work.

In this study developed by Boucasse & Lapparent (2019), the methodology that was used it was concerning public transport users preferences in surveys in the Rhones-Alpes Region

analysed through face-to-face and web-based interviews using the quota sampling as a sampling method, which included questions which were about the behaviours and the perspectives of the public transport users concerning public transport alternatives.

The survey was divided in three groups of questions related to the perceived behavioural control, perceived time, and feelings, featuring questions like "*I'm not comfortable when I travel with people that I don't know well*". In the first set of questions, the other questions were "*I just want to be on my own and undisturbed*" and "*It puts me in a good mood*", featuring in the question groups of the perceived time and feelings, respectively.

Another concept crucial for the Value of Time and for the perception of quality in the perspective of the users of public transportation is the crowding/congestion, which can influence negatively the trip experience for PT users in many ways, for example bad personal hygiene of users, too many people and noise and other inconveniences, which lead users to change their opinion about a service, as well as their individual experiences and develop "*negative social safety experiences, also known as NSSES*" (Mouwen,2015).

Negative safety social experiences could be more valued by customers because they have a bigger influence in their future choices, since they give more relevance regarding these negative experiences than positive experiences in the same mode of transport, for example, being stuck while going for work, an exam or other important event or getting robbed inside or outside of the vehicle.

In what concerns these negative experiences, there is the assumption that "*people who have experienced a negative social safety experience will be less satisfied with the safety inside and outside the vehicle in comparison to people who didn't experienced a traumatic situation when traveling with public transportation means*" (Mouwen,2015). For example, if a person experiences directly or indirectly a bad situation, like being mugged and sexually assaulted inside/outside the public transport, that person will avoid or think twice about if he/she wants to take the bus, metropolitan, train and ferry especially during night and late hours, especially in autumn and winter.

The concept of "*Transaction-Specific Satisfaction or simply TSS*" (Mouwen, 2015) needs to be compared to the overall user satisfaction. TSS results from a certain quantity of the transactions between the PT operators and their customers. In the case of the overall satisfaction, it is an emotional response from the PT costumer concerning the service provided by the PT

operator.

In order to establish relationships between attribute-based satisfaction, general satisfaction and the features of the customer, it was used a database with the "*satisfaction scores urban and regional Dutch PT users for the years of 2000 and 2001*" (Mouwen, 2015) and constructed three linear models. In the first model, general satisfaction was the dependent variable and the attribute-based satisfaction combined with the customer characteristics assumed the role of independent variables.

The second and third models were used to observe the implications of the customer characteristics towards their level of satisfaction. In the data analysis the technique of multiple regression was used with the purpose of studying the relation between overall satisfaction and a number of variables related to the description of the customers, which was important to study the interaction "*between the overall satisfaction and a number of customer satisfaction"*. The dependent variable consists in the measured satisfaction scores going in a range from 1 to 10. The resulting coefficients were estimated using ordinary least squares (OLS).

These variables are divided in two categories: The core attributes which features aspects like: "*on-time performance, service frequency, prices of the tickets*" (Mouwen,2015), the peripheral interactional attributes, which include characteristics like: personnel behaviour and the driver's behaviour which are more concerned to the staff who are employed in the PT operator and finally, the third set of variables approaches the physical attributes which englobes variables like: seating capacity, safety at stops and on-board information regarding delays, for example.

Factually, the customer's opinion about a service depends on the combination of several factors between pros and cons in financial and non-financial terms. Costs and benefits are determined by customer's preferences and its own characteristics. So, the needs of individual customers are notorious to be important conditions towards the satisfaction level regarding the experience in the perspective of the customer, as well as for the intention of repurchasing. Transportation needs are different between public transportation costumers since these users have their own needs, considering factors like several socio-economic variables, their preferences, the purpose of the trip, among others.

Related to the theme of Value of Time, the waiting time is a crucial factor for ferry and public transport because of the headway which consists in "*the time interval between the departures of a public transportation module*" (subway, train, bus, ferry, the latter in that

particular case), which it was studied by Andersen & Torset (2019) in their study about the waiting time in Norwegian ferries.

The headway works as a consequence for the inconvenience of relying too much on a scheduled service which is a common feature present in all modules of public transportation, since all the passengers organize their trip according to their schedule.

This consequence is divided into four categories: "*observed waiting time, hidden waiting time, punctuality and reliability*", according to Furth and Muller (2006), quoted in Andersen and Torset (2019). Observed waiting time is "*the time from arrival at the ferry quay until the scheduled departure*" of the subway, ferry according to Andersen &Torset (2019). The hidden waiting time describes the nuisance of not being able to travel at a wanted point in time therefore there is the need to adjust to the previously scheduled departure time.

The punctuality refers to unexpected deviations "*in the scheduled departure time*", (Andersen & Torset, 2019) and finally the reliability relates to capacity matters and the frequency of scheduled departures that are cancelled because of reasons linked to bad atmospheric conditions or technical problems.

Concerning the data collection of Andersen and Torset (2019), towards the waiting time, it was collected in the different ways, since the ticketing systems of the ferries has its own idiosyncrasies.

The first one was collected by the ticket booth, which the waiting times are determined based on the time which was registered by ticketing system, when the tickets were sold and in the next time that the ferry will depart. The second way of collecting this data was obtained using radar detectors, which compared the information obtained from the arrival times and the scheduled departure time.

In what concerns the data analysis, it was applied a travel survey in the process of data collection to better understand the characteristics of the passengers which use the ferry. The survey features questions like the purpose of the trip and the frequency of trips by using the ferry system. In the process of data analysis, descriptive statistics and linear regression were employed.

The descriptive statistics were calculated for each observed time interval for each ferry service. Regarding the linear regression, it was established a relation between the mean waiting time and the period between the departure and arrival of each ferry.

The reliability on the public transportation service, according to Abkowitz (1978), as referred in Jenelius (2018) concerns the "*consistency of the service features which influence the decisions of travellers and transportation providers*". These reliability indicators regard the number of trains/buses, the arrival time, the headway, the punctuality of the transportation modules concerning the departure and its arrival to the bus/train/subway/ferry station which can influence positively/negatively the experience of PT users, corresponding to the first level of the Maslow's pyramid adapted to public transportation present in Allen et al (2019).

The latter levels of this theory are related to the level of safety and security and finally, the comfort or the self-realization level as perceived by public transportation users. In the second level, there are the security attributes which are linked to the security and protection. These characteristics include the perception of safety against hazards like traffic accidents and crime, while waiting in the station for the vehicle to depart to their destiny or inside the vehicle. These attributes are also related to technical problems in the services or the phenomenon of crowding/congestion. Finally, security regards weather conditions and environmental problems inside or outside the vehicles (station).

Finally, in the top level is associated to other aspects of the transport module that can be perceived by the PT user as positive. These aspects are related to the overall perception of comfort and its linked variables like the perception of the number of the seats available, space available inside the vehicle and other services like wireless connection inside the vehicle or in the station, while waiting for it. Other attributes that can contribute to the PT user joy are the presence of integrated services (the pass card), availability (number and functionality) of payment places, physical attributes of the vehicle, presence of appropriate information to the user in the station, customer service, driver's politeness and image of the company.

Like the Maslow theory hierarchy need, the hierarchy of transit needs to be fulfilled in each level to focus to the next superior level. For example, if all the functional attributes are satisfied totally, public transport operators can start focusing on attributes on the security level and if they are achieved, public transport providers can finally satisfy the passenger's needs in the last level. Consequently, it can be achieved a sense of self-realization in the offer of public transportation. If the public transport providers cannot fulfil the needs present in one step, they cannot skip forward to the next degree of the pyramid. To obtain this data, the PT operators of four cities located in Latin America (Chile, Mexico, and Brazil), Allen et al (2019) applied "*Customer Satisfaction Surveys for specific bus-rapid transit type systems"*. The advantage of

these type of surveys is that they serve "as *benchmark between the different cities*" allowing to compare the results between cities within the same region, applying "*a minimum of 2000 surveys in each city*" (Allen et al, 2019).

There were developed two different types of SEM (Structural equation models) regarding the multiple group analysis to test the hypothesis. The structural equations models consisted in a numerical model which considered the satisfaction rates as natural numbers, implying that all the satisfaction components "*are treated with a numeric range*" (Allen, et al, 2019) and a ordinal model by "*using the satisfaction rate as ordered levels*" (Allen et al, 2019) and the satisfaction items are considered taking into account an ordinal range.

These models had the goal of establishing differences regarding the differences between the importance of several attributes concerning mobility such as reliability (functionality), safety (security), customer services and comfort (both in the top stage of the pyramid). The hypotheses made regarding this model are that the satisfaction influences the loyalty of the public transport users and all the satisfaction constructs, regarding the reliability/functionality, safety (security), customer services and comfort influence the overall satisfaction of the transport users.

The other methods that were used consist in the multi-group analysis (MGA), important for detect differences in the satisfaction models according to "*differences in travel and socio-demographic characteristics*" (Allen et al, 2019) and a structural equation model with finite mixtures (SEMM), which permitted to classify the subgroups considering the answers of the respondents rather than subcategories.

Figure 1 represents the graphic representation of the structure of the SEM models.

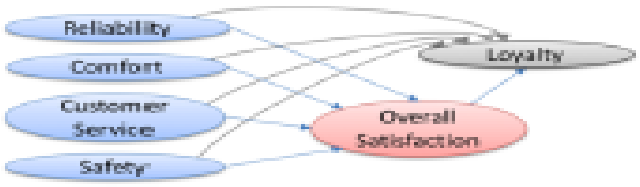

Figure 1- Structural equation models (SEM) structure. Adapted from J. Allen et al (2019) *Understanding Public Transport satisfaction: Using Maslow's Hierarchy of (Transit) Needs.*

Figure 2 summarizes the four levels of the transit needs, which are: reliability, security, customer services and comfort:

Figure 2 - Pyramid of transit needs. Adapted from J. Allen at al. (2019) *Understanding public transport satisfaction: Using Maslow's hierarchy of (transit) needs*.

Associated with this thematic of fulfilling all the transit needs, especially in the second level of this hierarchy, which is the security level mentioned previously in this dissertation is that "*crowding is infamous for contributing towards a low satisfaction in public transportation users and therefore the only attribute that goes down progressively in a temporal basis*"(Allen et al, 2019), as soon as the passengers leave in their final destination, mitigating the negative impacts provoked by crowding.

But the attributes linked to the reliability and frequency of public transportation "*are, without doubt, the most important*" (Allen et al, 2019). It is possible since once the excessive number of passengers in the departure, especially in the rush-hour, could be in fact a nuisance, but in the end of the trip, the PT platform is less crowded but the state of conservation of the train/bus/ferry and the dead time (waiting time, which includes also changing line or transport) between the departures, for example could be very frustrating for the passengers.

The reason for the relative insignificance of the crowding is that "*need to surpass a certain threshold"* (Borjesson & Rubensson, 2019) before it has an bigger influence in the satisfaction of PT users, for example the crowding could be very important in the subway of Lisbon in several occasions: before and after work/college, moments before or after a football match in SL Benfica or Sporting CP stadiums, this are occasions that the crowding will be have a crucial importance in decreasing the satisfaction of the public transportation users.

So, both reliability and crowding which are attributes linked to the performance of public transportation are crucial in what concerns the satisfaction of public transportations users, since

the reliability is better ,as well as, lower the crowding, the passengers will be more satisfied of using public transportation for their daily routine. The other different ways that performance affects satisfaction for these attributes in different public transportation modes will be considered.

In order to assess the impact of the crowding towards the Swedish system of public transportation, Borjesson & Rubennson (2019) in their study used the "*Stockholm Customer satisfaction survey 2008-2016 and automatic location and passenger counts for 2014 from vehicles operating in Stockholm*". In the first method, the Stockholm Customer Satisfaction Survey has been implemented since 2001 until nowadays and since 2014, each round of surveys, which is being conducted during two weeks, includes 10000 surveys in printed format being "*distributed and collected on board*" (Borjesson & Rubensson, 2019). The survey responses were given according a 1-7 Likert scale ranging from 1- Disagree completely to 7- Agree completely.

The other methods used in their study consist in the Automatic vehicle location (AVL) and the Automatic Passenger Counts (APC). The Automatic vehicle location (AVL) has the purpose of "*measure the travel time and reliability for all services on all lines and modes*"(Borjesson & Rubensson, 2019) and for the Automatic Passenger Counts, which measures "*the number of boarding and alighting passengers and load factors between the stop*" (Borjesson & Rubensson, 2019) in all public transportation modules except in the subway.

Linked to the reliability subject, it could be concluded that *"waiting time reliability and crowding levels have a very strong impact on users satisfaction evaluation"*(J. Parra et al, 2019), concluding also that irregular waiting times cause variations in the quality of the service provided and associated of the phenomenon of crowding could decrease the satisfaction of public transport users.

A survey was used to establish the connection between the variability of the waiting time and the satisfaction of public transportation users. It took place outside of four determined metro stations in Santiago de Chile (República, Universidad de Chile, Pedro de Valdivia and Manquehue) and their adjacent bus stops in 4 days, obtaining a total of 1150 responses, applied for "*both metro and bus users and gathered information regarding five aspects*" (Parra et al, 2019): travel satisfaction, number of trains/buses that they didn't board because they were at their full capacity, location during the most heavily section and characterization of the most heavily loaded section.

Ordered Logit Models were used in order to explain the satisfaction level given to the recently finished trip taking into account "*the conditions of the trip and the respondent's socio-economical information*" by using different models for subway and bus users as an introductory exploratory perspective to approach specific transport modes effects. With the objective of establishing a comparative analysis between the indicators regarding metro and bus users, a model was used considering these two modes of public transportation and with the purpose of establish preference heterogeneity, a latent class model was computed to represent and test "*the potential existence of a non-linear relation between crowding and satisfaction*" (Parra et al, 2019), considering logically the differences between these two public transport modes concerning its different operations (stopping in traffic lights and regular speed) and experiences(noise, vibration, tidiness).

Consequentially, it was tested the potential presence of a non-linearity relation between these two attributes by a double-fold analysis. The first perspective is that by "*incorporating an exponent parameter*" (Parra et al, 2019) and if it demonstrates itself significantly different than 1, exists statistical evidence that there is non-linearity between crowding and satisfaction, while the second perspectives postulates computing *"five different parameters for each level of crowding*" (Parra et al, 2019) and if it verifies that "*the difference between consecutive parameters*" is not the same, there is statistical evidence to assume the non-linearity between crowding and satisfaction, being the first perspective used in order to build the models in the study.

Another factor that it is believed to condition the travel experience and the customer satisfaction is the evaluation of cost drivers which according by Drury (2018) they are "*the basis used to allocate costs to cost objects in an activity-based system*" being crucial to trace accurately in which area an enterprise is having more expenses. The experience of PT users can also be influenced by the costs of the existing services.

With the objective of estimate and determine the cost drivers in public transportation these authors collected data by using a quantitative method (questionnaire) and a qualitative method (focus group).

The questionnaire consisted of two distinct parts. In the first part, the respondents were asked to answer background questions and in the second part, respondents had to answer questions regarding the identified cost factors mentioned previously. It was sent to the people who were working at the PTA's and in the companies, which operate the bus services.

The majority of the surveys were distributed by e-mail (88 surveys- 57 surveys to the public transport authorities, while 31 were distributed towards the bus providers), while the remaining were provided in the focus groups sessions (21 surveys) making a total of 109 respondents. The data obtained from the surveys was collected between March and June 2017.

The descriptive analysis consisted in means, medians (central tendency), standard deviations (dispersion) and Spearman correlations. Regarding the inferential statistics, were made *"t-tests of differences between means and of correlation coefficients*" (Lidestam et al, 2018).

In what to concerns to the focus group, it had the objectives of reinforce the credibility of the study and get a representative group regarding the public transportation sector stakeholders in order to foment productive discussions between different sectors of people within the public transportation sector, such as employees of PTAs, "*bus operators, industry associations, politicians and consultants, as well as other people invited to participate in the focus group through social media*" (Lidestam et al, 2018).

Regarding its process, the focus group was divided in two sessions, with the participation of "*between 15 and 25 people*" (Lidestam et al, 2018). In a first part, they were given several post-it with different colours that the respondents were suggested to write and put in the categories in the board. In the second part, after the sessions, the results were reviewed one more time and further notes taken while and after the focus groups.

Associated with the concept of perception and satisfaction, a good public transportation system must be implemented by diagnosing quality problems in its operations, because these problems according to Slack et al (2013), based on Parasuraman, A et al (1985) model could lead to the appearance of four major gaps which are:

- **Gap 1**: **The customers' specification versus the operation specification gap**, where the "*perceived quality could be poor because there will maybe a mismatch between the organization's own internal quality specification*" (Slack et al, 2013) and the needs of the customer;
- **Gap 2: The concept-specification gap**, where is the situation that perceived quality could be less satisfactory because there is no connection between the service or product concept provided and the way that the organization has specified quality in its inside;
- **Gap 3: The quality specification-actual quality gap,** where we can face a situation that the

perceived quality could be less satisfactory due to the non-existence of reciprocity between the real quality and the internal quality specification also known as ‘conformance to specification’;

- **Gap 4: The actual quality communicated image gap** occurs when the perceived quality could be considered not satisfactory, since there is a gap and therefore a delusion between the image that is provided by the department of communication/marketing of one determined company, which is result of unachievable expectations, and the real quality of the product/service that it is purchased by the costumer.

In order to align the quality of the service provided, several PT operators introduced several qualitative incentives in order to monitor and consequently improve the alignment of the quality of service provided with the needs and perception of their customers in order to fill those gaps previously mentioned.

The determinants of travel satisfaction don’t vary only between individuals, but their effect is noticed in different geographic contexts, for example: people who reside in higher density areas will give a certain value to different features perceived in their trip by bus, train, subway, ferry and people who live in low density areas will give a different importance to other aspects regarding public transportation. Long intervals of time also influence their travel satisfaction due to the capacity of individuals to learn and adapt thought the passage of time.

This concept along as the concepts of traveller's behaviour and satisfaction is influenced by several factors like “*individual attributes, contextual variables and attitudes*” towards public transportation (Abenzoa et al, 2017), as well, from region to region (geographical context) from groups of Public Transportation costumers with the most different needs and expectations, since previous studies concluded that socio-demographic indicators influence their satisfaction and behaviour towards public transport, as it will be observed in the latter stages of this assignment.

In order to achieve these results, Abenzoa et al (2017) in their analysis “c*onsidered the Swedish Public Transport Barometer dataset*” between 2001 and 2014, where data such as “*service quality, individual attributes, perception and attitudes are available at the individual level*” (Abenzoa et al, 2017). The travellers were clustered regarding several attributes based on their socio-demographic attributes, travel patterns and accessibilities splitting them in five segments of travellers: “*1- the inactive travellers, 2- long distance commuters; 3- urban motorist commuters; 4- rural motorist commuters and 5- students*” (Abenzoa et al, 2017).

To finish the discussion about the satisfaction of PT users, the role of predicted, experienced, and remembered satisfaction in what concerns to the use of public transportation also appear in the literature. It was considered that "*remembered satisfaction in the use of public transportation was lower than predicted satisfaction"* (Al-Ayyash & Abou-Zeid, 2019) after a period of time, reinforcing the argument that NSSES's previously approached have a decisive role in the future choices of public transportation users.

Their contribution was achieved by using an online survey in springtime that was applied to the educational community of the American University of Beirut (students, teachers, and non-docent staff). The respondents "*were invited to answer it voluntarily*" (Al-Ayyash & Abou-Zeid, 2019). Regarding the sample, the survey was answered by 1314 students out of a total of 8094 students and by "*1167 out of 4173 staff answered the survey*." (Al-Ayyah & Abou-Zeid, 2019).

Concerning the data analysis, it was developed a satisfaction equation model, being used the same two samples in the staff and student groups of respondents, 497 responses of bus and jitney users and 297 responses from car users. The first equation was related to the satisfaction of car users regarding with their commute using their own vehicle (H1) while the second equation of the model predicted car's user satisfaction taking into account their remembered satisfaction concerning public transport (H2), being the commute by car and the remembered satisfaction regarding public transport the dependent variables, respectively.

Another important contribute that is relevant and interesting to the thematic of the transports and certainly to this work is definitely the well-being, which it is a thematic explored in professional areas(work and income) and personal areas (such as marriage and health), being this concept of well-being less studied in the transportation sector. Travel well-being is important because, firstly it is directly linked with sustainability and central and local governments "*have started to incorporate well-being into their public policies*" (Zeid, 2009), since planning sustainable transportation systems which have the contribute to travellers well-being is relevant to the intellectual domains of transportation and urban planning.

In second place, travelling is linked to psychological benefits, since people value their travel as a way of "*self-expression, control or escape*" (Zeid, 2009) and an increased well-being reinforces these psychological benefits.

Thirdly, there can be conflicting effects between "t*ravel well-being and well-being related-activities*" (Zeid, 2009). An example of this, it is the well-being concerned with the

commute trip since several aspects since "*moods at home in the evening and performance at work*" (Zeid, 2009), are strongly linked to the phenomenon of commuting stress which has negative repercussions in driving capabilities and could cause serious health problems. So, implementing travel well-being by lowering commuting stress is crucial to improve health, foment the performance in the workplace, as well as other issues.

In the final aspect concerning the importance of well-being, it is important to know the affective states. That was achieved through technological advances and "*physiological measurement methods*" (Zeid, 2009), which allowed the design and implementation of vehicle systems that can trace these affective states. These systems have the functions of giving awareness of the environment to drivers, giving them the best judgment in a serious situation, defining which information is more important, facilitating certain manoeuvres and finally, reducing the workload.

A practical example of these systems is when a driver is stressed about some issue, several incorporated "*in-vehicle systems such as radios or cell phones*" (Zeid, 2009), the implementation of which can be very useful to help the driver of public transportation to deal with his/her stress, while driving.

In the domain of well-being, it includes the cognitive and the affective components. The cognitive component is concerned about the "*satisfaction judgment of the conditions of one's activities and travel experiences*" (Zeid, 2009), while the affective component is concerned with the feelings experienced while traveling. Affective reactions are essentially temporary feelings that are linked to specific time marks/events, while the cognitive aspects of well-being are portrayed as satisfaction judgments which are more turned towards long-term, being influenced by accumulating several experiences while taking a trip by using a PT module.

In what concerns the factors of well-being, qualitative factors have a decisive reason towards the public using or not using the public transportation module, since they are severely conditioned by the quality of the available travel alternatives. The factors that have a great importance regarding the quality of the travel include "*comfort, safety, reliability*" (Zeid, 1999) by reinforcing the idea of the pyramid of the user necessities towards public transportation mentioned in Allen et al (2019), since people are most likely to prefer certain means of transportation regarding others for certain types of trips and doing certain activities in order to make the travel experience more enjoyable and less painful.

Despite their importance, these factors are not represented explicitly and they are being subject of negligence in traditional evaluation practices, which could influence greatly funding decisions with the purpose of "*improving the quality of the travel experience*" (Zeid, 1999), like improving the quality service verified in public transportation.

Well-being is, in sum, crucial, because it gives to PT users and public transportation providers a better insight and a "*better modelling of activity and travel choices*" (Zeid, 1999) and that activity and travel well-being is about the "*people's satisfaction with their activities and travel experiences*" in their own view, since several decisions could reduce/raise the well-being, for example living comfortably outside the town but meanwhile, living far from the workplace, which could contribute towards decreasing the well-being regarding the trip as well as, influencing other important life decisions regarding housing, getting a new job, searching for a job and so on.

Besides that, the personality of individuals is also important towards the importance of well-being, since individuals could be less tolerating towards delays of numerous reasons than others and other individuals which plan everything in order to arrive within the time they predicted, being seriously frustrated if they there is a unpredicted delay in the regular circulation.

Finally, regarding well-being people are likely to conduct comparisons that affect their satisfaction. These comparisons could be of "*interpersonal/social and intrapersonal/ intra-individual comparisons*" (Zeid, 2009).

In what concerns the methodology used by Zeid (2009), it was used a *"cross-sectional web-based survey".* The survey was primarily targeted to the trip home-work-home, also studying other trips outside the work and well-being of the individuals concerning these outside activities. The respondents classified their satisfaction in a 1-5 Likert scale from Very dissatisfied to Very satisfied. Concerning its commute stress, attributes, and enjoyment, they rated several statements following a 1-5 scale that went from Strongly disagree to Strongly agree.

The survey was sent via e-mails to friends, colleagues, and random anonymous web users. It was online and included a few personal interviews to complement methods. The data used had taken time between June and October 2007.

It covered the following modes of commuting to work: solo car driver, car driver with passengers, car passengers, bus, subway/train, walking and bicycles. The sample which was used to build a model estimation consisted in "5*94 observations for the commute satisfaction model*"

(Zeid, 2009) and between 558-676 respondents regarding the activity participation models. Table 1 summarizes the past studies regarding the components of satisfaction with public transport services.

Author(s)	**Factors that influence passenger satisfaction with public transport**	**How these factors were studied in the literature?**
Camén & Lidestam (2016) in Lidestam (2018)	Cost Factors	Focus group(of 15-25 participants - two sessions which were applied to several stakeholders like industry associations, consultants, politicians, bus operators and public transportation authorities-PTA) and surveys(only PTA and bus operators- 57 surveys at the PTA, 31 to bus operators and 21 were distributed in the focus groups sessions to the other groups)
Mouwen (2015) Al-Ayyash &Abou-Zeid (2019)	Negative Social Safety experience (NSS'S) Predicted, Remembered, and experienced satisfaction	Linear Model estimation (using a dataset between 2010 and 2011) Multiple regression and OLS (Ordinary Least Squares) Online survey between Springtime (April to May 2017) applied to two different data sets (students-1314 and staff- 1167) Satisfaction equation model for car users (237 responses) and public transport users- bus and jitney (497 responses)
Mouwen (2015)	Individual needs of passengers and intention to repurchase	Linear Model estimation (using a dataset between 2010 and 2011) Multiple regression and Ordinary Least Squares (OLS)
Borjesson&Rubensson (2019), Abkowitz (1978)	Reliability and Crowding	Stockholm Customer satisfaction Survey, Automatic Vehicle Location (AVL) and Automatic Passenger

		Count (APC)
Allen et al (2019)	Reliability, Security and Safety, Comfort, Customer Service	Customer Satisfaction Surveys for specific Bus Rapid Transit (BRT)-type systems in 4 cities (Santiago, Mexico City, 2 in Brazil), collection of 2000 surveys in each city. Construction of Structural Equation Models (SEM)
Andersen and Torset (2019)	Reliability and Crowding	Travel survey, Ticket Booth and Radar detectors Descriptive statistics and Linear regression
Abenzoa (2017)	Individual attitudes, contextual variables, and attitudes towards transport satisfaction	Swedish Public Transport Barometer (SFTB)- between 2001 and 2014 Clusterization of the respondents based on determined attributes (socio-demographic, travel patterns and accessibilities
Boucasse&Lapparent (2019) and J. Alen et al (2019)	Availability and/or the quality of infrastructures (seats, wireless connections, noise level, cleanliness.	Survey (directly with the users and on the Internet) Customer satisfaction surveys for specific Bus rapid transit (BRT)- type systems in four
		cities (Santiago, Mexico, 2 in Brazil), collection of 2000 replies in each city. Construction of Structural Equation Models (SEM)
Boucasse&Lapparent (2019)	Value of Time	Survey (Face to Face with travellers and on the Internet) Model to investigate the heterogeneity regarding the Value of Time (VoT) variables

Meng (2018)	Total travel time	Accompanied survey with the respondent from origin to destination (437 in total, 316 with one-time transfer, 109 with 2 times transfer and 12 trips with 3 times transfer), being the first ones used for data analysis and modelling Usage of T-tests and linear regression models
Andersen &Torset (2019)	Headway/waiting time/punctuality/reliability/hidden waiting time	Travel survey, Ticket booth and radar detector (waiting time) Descriptive statistics and linear regression
Slack et al (2013), based on Parasuraman, A et al (1985)	Quality gaps	Executive interviews and Focus groups
J. Souza Parra et al. (2019)	Head away reliability	Survey in four subway stations in Chile and in their adjacent bus terminals applied to 1150 respondents. Ordered Logit model and Latent class model of subway and bus. T-test to test if there the existence of non-linearity between satisfaction and comfort.
Zeid (2009)	Well-being	Online survey and personal interviews. Commute satisfaction model (594 observations) Activity participation model (558-676 participation)

Table nº1- Factors found to affect passenger satisfaction with public transport, according to previous studies.

2.2- Gender specific issues in transport

The objective of this part of this dissertation is to, first, describe the concepts of gender

equality in transport and its evolution. The second objective is to identify causes that lead to gendered mobility and see concrete cases adopted by certain countries to mitigate this inequality and stimulate women to use PT modules.

2.2.1- Gender and causes for gendered mobility

Gender, according to the OECD (2011) is the "*social construct which determines the social relations between men and women*", according to a study inspired by the gender strategy action of the World Bank (2000) and with the objective of enhancing its policy strategy regarding the transportation sector. The Gender and Transport Thematic Group was created in 2001, and the World Bank alongside "*with other sponsors, funded ten case studies of the integration of gender into transport projects* (OECD,2011).

Gender equality in transport has the objective of "*reducing mobility inequalities between men and women*" (JRC Science for Policy Report, 2019).

In the optics of Aloul (2018), this issue between transportation and gender exists as an "*intersectional issue involving the socio-economic differences in needs between men and women*" which leads to several differences and even great inequalities, so consequently in order to promote gender-equality, political players both in the public sector such as the central government, as well as, the local government and the public transport providers which are situated in the private sector have to consider a gender lens.

The gender lens consists of the "s*pecific gender aspects of infrastructures strategies, policies and projects and to ensure the engagement of women in the design of infrastructure strategies and infrastructure supply chain*", according to OECDE (2019). To foment the necessary structural changes to promote socio-economic changes in what concerns the social phenomenon of gendered mobility which is linked to socio-economic factors, way-of life standards and the women's position need to be addressed.

One of these examples is that taking children to school and day-care and then back home which are tasks which are exclusive for certain parts of the days, and that task is only taken by women, which means that women cope with time pressure and scheduling that affect their employment situation that "*is more likely to be part time and closer to home than men's employment*" (Craig & Van Tienoven, 2019). Travelling with children also involves assuring their safety and control their behaviour, so it can be a very tough challenge.

Consequently "*convenience, incorporating drop-offs and pick-ups into trip chains, concerning about traffic dangers*" (Craig & Van Tienoven, 2019), as well as, the danger represented by paedophiles and other assailants are the main reasons why parents ferry their kids by car. The data used was provided from "*nationally representative time-use surveys of Australia (2006), UK (2014), Spain and Finland (2009)*" (Craig & Van Tienoven, 2019), where the individuals recorded their daily schedule by using time diaries. The information obtained in these time entries was related to the purpose, module of transport and presence/absence of people. The sample was applied to adults from 24 to 54 years old.

Issues that women face according to several authors are identified and summarized in table 2. Aspects that lead to a gendered mobility consist in the following: socio-economic aspects which are "*affordability, harassment and safety, travel patterns, poverty and likelihood and finally governance and financing of public transport*" (Aloul et al,2018). These aspects were influential towards a survey implemented by SADAQA, among a sample of 497 surveys which "*were filled by women who use public transportation in Jordan*" (Aloul,2018).

Gendered mobility is even more extreme in countries like Jordan and Pakistan where female mobility is monitored by asking permission to their families, the use of the veil and escort of a men of the family, since travel is considered "*a potentially risky activity for women as it may lead to unwanted interactions with men and loss of honour*" (Muhammed et al, 2017).

Consequently, these social practices limit and even seriously undermine female mobility decisions such as the timing, mode of transport and the selection of the path, by discouraging them and low their quality of life in developing countries. They also have a major weight in fomenting *"significant differences in the daily mobility behaviour between men and women*" (Muhammed et al, 2017), being a thematic irrelevant in Pakistan.

The data present in the study of Muhammed et al (2017) was obtained from the 2007 PTUS dataset, which represents the Pakistani population. It consists in a data basis of the Pakistani population living in rural and urban areas, except from few territories, homeless people, and children below 10 years old. The survey compilated "*data from a national sample of 19600 household*" (Muhammed et al, 2017).The study had taken place between January 2008 and February 2009, covering 97% of the Pakistani population, excluding children below 10 years old and "*78% of the overall national population*" (Muhammed et al, 2017).

First of all, it could be assumed that the affordability, poverty and likelihood and the

travel patterns are directly linked, since women do more trips of short duration(from home-to work, than work to school to pick their children and finally back home), resulting in buying transport tickets, thus having an important role in the domestic budget, since "*women are more likely to buy monthly transport passes*" , according to Vance & Peistrup (2011) especially in women families of low income that live in Lisbon, which have less chances of seamless mobility and consequently, increasing their quality of live and access to opportunities, consisting in a form of social exclusion, therefore women prefer to go to their work walking or cycling or use car-sharing also known as car-pooling.

These findings were based on the MOP, which is "*a multiyear travel survey*", according to Vance & Peistrup (2011), financially supported by the German Federal Ministry of Transport, Building and Housing. The data had been applied from 1996 to 2007.

These surveys are only answered by individuals above 17 years old. The individuals are requested to fill a survey containing data regarding the general household information and their socio-demographic characterization alongside with "*relevant aspects of everyday travel behaviour*", in the view of Peistrup (2011).

Besides descriptive data, it was used a heteroskedastic probity model with the objective of controlling the effects of the unobserved heterogeneity of the variances.

Another interesting perspective about travel patterns are the existence of activity-based models which are related to the concept that trips are a driven purpose "*of individuals to perform out-of-home activities*" (Hayati et al,2017) in several places. These models refer to a trip chain which is a set of trips between two crucial points: house and work.

Relating to the gender issue and the travel pattern issue is that gender plays a big influence in these models, since women have a bigger tendency "*of performing multiple activities"* in the view of Hayati et al, (2017), in comparison with men consequently having more trip chains during a single day. The method used for examining the travel patterns in this perspective is the Space-Time Prism method. This method is pertinent to characterize the standard of trip-chains performed by women in the role of housewives "*with a spatial approach based on distance and time"* (Hayati et al, 2017). It explains the type of daily trips considering the number of stops, concerning activity-based discharges.

In order to explain the aspects that influence women's activity taking into account variables like the household context and the singularities of travel patterns, *"a regression*

approach with Seemingly Unrelated Regression (SURe)" (Hayati et al, 2017) has been used to adapt ordinal and nominal variables considering the information obtained in the survey.

New mobility services can be used to improve the travel experience of users and especially women such as car-pooling, which has the advantage of giving women a "*certain degree of auto mobility in terms of spatial reach and temporal flexibility*" (Matsuo, 2019) and a great opportunity to avoid congestion and deal with harassment and violence from assailants, but has disadvantages such as scheduling and unreliability, which denies people of accessing opportunities to go to school/college, getting a better/new job and, of course, socializing with their friends. The key source of the findings of Matsuo was the 2009 National Household Travel Survey, which understands "*household characteristics, personal characteristics of the household members*" (Matsuo, 2019) and the features of the vehicles owned by the households. The target audience of this analysis were Black, Hispanic, and non-Hispanic white adults from 22 to 69 years old.

The other measure that women use consists in car-sharing which is the rental of vehicles by the hour or minute and the fee charged, which is the primary source of revenues in this industry, being based on the length of the rental in hours or vehicles covering expenses like maintenance, insurance, fuel and parking. The main advantages of the car-sharing consist in the following: "*flexibility, convenience and not needing to have a car*" (Almeida,2019) and also having a guaranteed parking, the quality of the service, can use this service for leisure purposes and avoid the chance of dealing with a bad public transportation service.

Car-sharing operators such as Uber, Cabify, among others with support of technology present in smartphones (Android and/or Apple), allowing automated reservations and transactions by linking the app with payment applications such as MB Way and PayPal, so the passengers can track the progress of the driver in real-time. Women consider this service advantageous since they make small but numerous trips due to their numerous roles in their household (mother, worker and wife) and they don't have enough purchasing power or time to buy a new car and they are more concerned about environmental issues than men.

A survey was performed with women living in Baden-Wurttemberg during springtime, "*using several different web polling agents*" (Almeida, 2019). The answers were based on a Likert scale from 1 to 5 and 228 surveys were correctly answered. Several socio-demographic variables such as gender, age, income, and education status were used for the purpose of obtaining "*detailed segmentation of data*" (Almeida, 2019)

Secondly, women are more subject of being harassed or even being target of physical, psychological and sexual violence while waiting or inside the PT module, since according to a study that took place in France between 2014 and 2015 that was mentioned in the JRC Science for Policy Report (2019) which mentions Tabary (2017) "*267000 people were harassed in public transportation and the majority(85%) were women*", especially at night time and particularly in autumn and winter, since the days are shorter which leads to avoid travelling alone in public transports and adopting other means of overcoming this issue, by using carpooling and travel along with friends and colleagues. This issue is still under-reported, and the numbers could be deceiving compared to the reality due to fear of retaliation of offenders.

This question of harassment leads to a more pernicious consequence because women due to their fear of travelling alone in a public transportation, could "*miss several professional opportunities that could result on improving their quality of life and consequently improve women access into opportunities and consequently reduce gender differences between women and men*", being underlined by Monteiro et al (2016) and Aloul (2018) in their studies.

A sustainable transportation system could offer women the opportunity of a finding a proper employment in a respected context reinforcing their position in societies, increasing the economic development and reduce socio-economic asymmetries. Monteiro et al (2016) reached those findings by applying an online mobility survey where each person reported all the trips taken during one day as well as the trips also taken by all the household and if they have access to their own means of transport and by phone by using a large sample.

Finally the lack of governance and financing concerning the public transport modules could be pernicious to all sectors, since the lack of funding and regulation from the public sector and irregularities occurred in the transport provider (low reliability, scarce human resources and less qualified human resources), could be a very serious nuisance towards women travel patterns (more waiting time), women security (lack of human resources present in the vigilance of the stations and carriages) which could lead to less satisfaction of the public in general, especially women, since the quality of public transportation is low, leading them to choose other forms of travel.

To close this discussion about gendered mobility, factors associated with NSSES such as experience travel, wait time and risk aversion associated with the causes described above can deteriorate the trip for women leading to "*gendered travel choices"* (Shirhaokar, 2019). Another factor that contributes to gendered differences concerning public transportation is the commuting

time, since housing location choices are more permanent compared to the choices concerned to the workplace.

The same author followed a case study perspective which was the Greater Mumbai Region and a non-probabilistic sample based on an intentional sample selection, pointing that qualitative techniques can "*enable the exploration of deeper constructs*" (Shirhaokar, 2019) that surveys are too limited to explore that information. The case study used focus groups, following three dimensions which were the gender, the phase of young adult life and the workplace in the region englobed. It had the objective of obtaining answers on various aspects of the travel options and habits from the respondents and in the final stage of this focus group, the feedback of the respondents was used.

Although these problems, women according to Sovacool (2019) are *"reported to be slightly more aware of environmental and sustainability concerns then men, since they display more concern about household related aspects such as waste separation and healthy food*" and mothers will have an even more important role in the future in what concerns to provide to youth generations lessons about environmental awareness and green practices, serving also as a new potential market segment to public transportation providers and a cause to improve public transportation in order to mitigate gender differences observed in urban mobility.

The good practices adopted to promote the use of public transportation towards women to diminish the gender inequalities verified in public transports will be approached in the next point of this study.

2.2.2- Examples of good practices concerning mitigating gender differences

With the purpose of mitigating these gender differences and attracting women towards public transportation, several measures/policies have been taken over the years by public transport providers. One of these measures was the implementation of a service design meant to assure the security of women in the London Metropolitan area.

Regarding the issue of affordability in the trip patterns of London, it was observed by Hasson & Polveloy (2011) "*that people with low income and part-time benefited by discounts, as well as, that elder with more than 60 years is provided free transport*". In Sweden, it was also found by Hasson & Polveloy (2011) that "*in Sweden 1/3 of the users of public transportation is available for financial benefits and more women than men enjoy discounted fares*". Both findings are present in the national statistics in the National Travel Survey (Great Britain) and in the SIKA

(Swedish Institute for Transport and Communications).

In order to mitigate this challenge, local governments in the process of creating local transport design need to consider "*transit fare structures to minimize costs for multi-stop journey*s" (Peters, 2013), in order to face the challenges of affordability, poverty and likelihood, public transport governance, funding and travel patterns towards an equal mobility between men and women.

These guidelines concerning harassment and safety refer to three important topics: Service staff and police, technical equipment, visibility, and service reliability to reduce the fear of crime. All of them have severe social, economic, and psychological consequences, according to several authors. Such aspects are, the sense of being powerless, avoiding certain areas and activities on them, particularly at night, and of course, due to the fear of crime, the reduction of the use of public transportation, particularly on women who have been subject of harassment and sexual violence and ultimately, reduce the access of women to better opportunities of raising their quality of life and contributing to make the gender differences regarding mobility more significant.

In the first topic, women and public transport users in general want to consider that "*authority is in their field of vision in the case of an emergency, so it is needed to increase the number of patrols in the stations and inside the vehicles*" (Kim, 2019) and making the personal staff more visible by using uniforms. The relevant information about the location of the police and public transport provider staff should be communicated properly to public transport users. The surveillance system must be created and managed to reinforce the environmental issues, which are influenced by the morphology of the infrastructure, the surroundings of the area that the infrastructure is situated and temporal aspects.

In what concerns to the technical equipment, it is crucial to design and apply equipment and devices like CCTV and help points, for example, that connect users of public transportation modules to the public transport providers and security forces, in order to provide a more effective responsiveness of the authorities. To achieve a better intervention, the distance between users and authorities should be near in proximity and visible in the perspective of the user. The effectiveness and adequacy of police officers and employee's intervention to a situation of tension need to be assured through permanent monitoring and swift response and the relevant information that should be clearly communicated in visual format in the control room.

That appears to be true in the particular case of women, since "*female passengers appear to consider CCTV as evidence to prove crime or catch offenders after committing crime*" (Kim, 2019) but it is limited in the view of making them more secure in the stations and consequently stimulating their use of public transportation.

An interview with women that use public transport was used as a qualitative technique of research. About 31 women participated to the interview. The participants were recruited outside the train stations, while they were prepared to take the subway. For ethic reasons, each potential participant was "*informed of the purpose and usage of the interview*" (Kim, 2019) and their rights. The interviews were done by using audio format (with the permission of the interviewees), then the data was transcribed and finally analysed. Regarding the process of data analysis, the study adopted "*the coding method of Strauss and Corbin's version of grounded theory*" (Kim, 2019) by implementing the following steps: 1) open coding; 2) axial coding and selecting coding in the ultimate steps, but following the criteria of the themes of fear appraisal, the gender(ed) roles and finally the analysis of the situation.

The spatial inaccessibility to escape during the service is a specific inconvenience in what concerns to female passenger's fear of crime, being justified by the configuration of the station in the underground which limits all movements. In the case of every underground, in this case Lisbon's underground, technical accessibility could be reinforced by using Wi-Fi in moving carriages, since it is already possible to use it in the stations and data mobile is also a solution, in order to avoid the emotional isolation of female users due to their tendency of wanting emotional support from people that they know.

In Sweden, in which regards to safety, according to CIVITAS 2020, some municipalities "*started to remove bushes*" which reduce visual awareness of people and give cover to offenders to approach potential victims and to evade the security/police, the elimination of dark accesses such as tunnels and the creation of night buses that deliver passengers before reaching the usual stops. These stops also known as 'night stops', which can be a way of them getting out without undesired company.

The last topic consists is the service reliability seen before as one of the main influencers of the perception and satisfaction of public transportation users. The service should be accurate transmitting information to the users to decrease feelings of uncertainty and more seriously, hysteria and panic from the users since that the influence of service reliability on female's fear of crime is already important. Awareness is important when there is the fear of attacks allowing to

move out of the subway carriages during an emergency or to escape of a dangerous situation.

Another good example of a good practice is the "*creation of a Smartphone app as an effective and discrete method for passengers to report suspicious activity, which are used in Philadelphia, Boston and Los Angeles*" (Kim, 2019), by sending image and text messages that are forwarded directly to the police.

That measure associated with increasing police/staff presence and information about where these authorities can be found could significantly reduce the female passengers of being harassed or even more vicious violence in the public transportation existent offer.

Other good practices also can be formulated to reinforce the capacity of correspond to the mobility needs of women as well as of the men, following a sustainable standard. According to CIVITAS 2020, these measures that need to be taken towards achieve more gender equality are in three great domains: "*knowledge, infrastructures and services*":

1- Knowledge: By incrementing detailed statistics, developing further research, raising awareness about this theme, stimulate gender involvement in decision-making since women are better aware of their needs in what concerns to public transportation and implement instruments. Examples of these practices were the local transport plan (Berlin), by using a survey, the "*gender main streaming in the public transport System*" (Civitas2020) which used as technique of collecting information in several focus groups, which took place in Sweden;

2- Infrastructures: In this area, public transport providers need to increase the level of safety and security with measures like: reinforcing security presence, more lights, more surveillance cameras, for example, enhance the quality of walking and cycling paths since women like to walk and/or cycle to their destination and improve accessibility in vehicles, station and stops, as well as in the accesses for vulnerable groups: such as pregnant mothers, elders, people with physical and or mental disabilities and mothers that carry children. Some of some measures taken in this field consist of "*implementing safe, accessible and well-lit bus stops, equipping steps with communication for guard services, in-vehicle seats reserved for women near the driver, provide underpasses and transit places(metro) with mirrors or other devices*" (Civitas 2020), for example.

The PT operators need to "*adapt the interiors of public transport vehicles to the needs of women*" (Civitas 2020), by using low-floor vehicles, provide interior with appropriate room for certain materials such as strollers, shopping carts, among others and improve the accessibilities to

the railed transportation (subway and trains).

3- Services: Meanwhile the public transportation is in their majority developed for travel in the city during rush-hours, women have the need of transport in their influence area in the temporal context of outside of rush-hours with the objective of making short but numerous trips. Examples of these services consist in the pink parking, pink taxi, and pink fares for mobility services.

The "*pink parking, for example, is used in Germany to dissuade assailants to make vicious attacks, reinforce women's safety and security in parking spots*" (CIVITAS 2020) with a lot of stories which have dark corners and less movement and to making a better scheduling regarding the daily routine of women and their trips, being also which was implemented in the Italian city of Bolzano.

The other measure that was implemented also in Bolzano, Italy was the 'Pink Taxi', which consists in a "*taxi service available for women in the evening hours until night hours"* (Civitas 2020).

Finally, there are pink fares for mobility services that have the benefits of discounted trips for the service of car-sharing all day long and a daily pass that offers several trips to women. It is a good measure, since women due to their travel patterns, mentioned earlier in this work, have a lot of short trips from house-work and other routes, mostly for their children.

In Austria, it was applied an mobility survey about the thematic of gendering mobility concluding that "*women walked more, taking several routes*" (Monteiro, 2016), using a range of transport modes for commuting (underground, buses and taxis), implementing measures such as "*increasing the lightning and creating ramps in staircases in the streets*" (Monteiro,2016), with the goal of easing the mobility.

In London was implemented the ´Safer Travel at Night Programme" (Monteiro 2016), which consisted in an initiative to raise awareness regarding the hazards of using illegal minicabs. It involved underground campaigns as well as the reinforcement of the police presence in the streets.

This range of initiatives evidenced that with scarce economic resources, local governments can offer visible effects to women with the purpose of meeting their expectations towards their safety having the advantages of providing alternatives to mobile platforms such as

carpooling and reinforce the degree of safety of public transportation consisting in a good measure to face the challenges of affordability, safety/harassment and travel patterns approached before in this work.

The information present on CIVITAS 2020 was obtained from a review of European Statistics, National Statistics concerned about the needs of women's in subjects related to PT modes, the "*Driving and Parking Patterns of European car-drivers- a mobility survey*"(Civitas 2020) and the review of some politics taken in EU-members including Portugal concerning sustainable mobility.

Although the impacts of pink-transports were good, women liked them since they feel safer and calmer in these services, characterized to be cleaner and less crowded than public transports. But pink-transports were subject for criticism because of these measures are more like an reactive action to deal with a serious problem at its best scenario and a failure to deal with the issue of safety/harassment in the worst case scenario, motivating fierce criticism of several gender-equity defenders which considered it as "*a step back rather than forward*" (Peters, 2013).

An interesting measure in developing countries was the Afribike project towards women mobility. Its main objective is to provide bicycles women from developing countries and give them training about how to ride a bicycle. This measure allowed to increment women's safety, provide an economically sustainable access to other ways of transport and finally, "*eliminating excessive walking and head loading*" (Peters, 2013).

That point of view is reinforced since women are more concerned about safety than men, being a "*significant factor in bicycling choice*" (Prati,2018) and as previously mentioned through this thesis, determined cultural factors and gender roles are the main factors that lead women for choosing cycling. It is proved since women from countries that promote conditions to use bicycles use cycling as a way of transport due to the "*their relatively high-quality cycling infrastructure*" (Prati, 2018), also being evidenced in Lisbon, where the municipality is improving the facilities for people that use bicycle in alternative to public/private transport and due to the app "GIRA".

Violence influences the participation of women in adopting cycling as main moving mode, since it provided an opportunity to women to avoid dangerous situations in walking or in the public transport, but the impacts are small since they are still subject of not only harassment/violence of every type and behaviours/norms that are convenient and subtly

legitimate the occurrence of these degrading situations, influencing negatively the use of cycling by women.

To achieve conclusions regarding the influence of cycling in women, Prati (2018) used three major choices of information. The first one was the "*Eurobarometer survey on the attitudes towards mobility in the EU in 2013*" (Prati, 2018), being applied in every member-state of European Union(EU), the information present in the GEI (Gender Equality Index), which was provided by the European Institute for Gender-equality, with information obtained in 2012.

The GEI was based on several indicators present in several information sources, considering the positions of men and women compared to each other by producing a score that goes from 0 to 1, where the maximum score (1) represents complete gender equality. Values between 0 and 1, refer to a "*proportional lack of gender equality in a given indicator*" (Prati,2018) and the value 0 traduces a full gender inequality. And finally, the indicator of the GDP present in Eurostat which was used for the purpose of including in the study, a "*measure for the economic activity*".

The statistical analysis was performed by using a standard "*Bayesian hypothesis for correlations and partial correlations*" to establish relations between the use of cycling and variables that make part of the GEI such as violence, money, work and time, for example. The Bayes factor computes proof the overall probability in favour of both null hypothesis (H0) and alternative hypothesis (H1). The other factors that condition positively/negatively consist in the specificities of the trip, division of tasks in the household, alongside with the presence of children.

To close the discussion about issues that women face while using public transportation, table 2 summarizes all the concluded issues that women face in public transportation in previous studies and a list of initiatives and policies that have tried to increase the use of women in public transport. To answer and achieve these objectives, several key questions relevant for this investigation need to be formulated, based on the previous study of the literature review and the questions of the survey. The set of key hypotheses consist in the following:

1. Women are more concerned towards security issues in the public transportation than men.
2. Perceptions on comfort have an impact on the satisfaction of public transportation users.
3. Perceptions on security have an impact on the satisfaction of public transportation users.

4. Perceptions on functionality/reliability have an impact on the satisfaction of public transportation users.
5. Perceptions on services are important have an impact on the satisfaction of public transportation users.
6. Perceptions on reliability and accessibilities have an impact on the public transports are important for the loyalty of the public transportation users.
7. Perceptions on comfort have an impact on the travel well-being between public transportation users.
8. Perceptions on security existing in the public transport, as well as, in the stations are crucial for the loyalty of the public transport users.
9. Women feel more secure in the private transportation when compared to men.
10. Public transport's services have an impact on the loyalty and travel well-being of public transport users.

Through the literature review, the main factors that lead to the satisfaction of public transportation users were identified and summarized, as well as the factors that contribute to a gendered mobility. Also, the measures taken by several actors to mitigate their inequalities in mobility in both developed and developing countries were addressed.

In the next chapter, the method to analyse both themes will be presented.

Author(s)	**Problems and Challenges that women face in public transport**	**Initiatives and policies that have tried to increase the use of women in public transportation**	**What were the results of this practices? Main features of these practices.**
Aloul et al (2018), Thynell (2016), Sovacool (2019), Shirhaokar (2019) Vance &Peistrup (2011) Hasson &Polvevoy (2011) Peters (2013)	Affordability	• Pink parking, pink taxi, and pink fares. • Reducing the prices of transport passes. • Reconsider transit fare structures to reduce costs for multi-stop journeys • Discounts to people with part-time and low income, Discounted fares.	• Provide valid options to the private mode and reinforcing the safety level of public alternatives at a low cost for local governments. • A better distribution of women's travel times through their daily routine (more tickets in PT have an important impact in the family budget) • Vulnerable people due to several limitations (mobility,

Prati (2018)		• Elder people travel by free. • Afribike project • Promote Cycling and improve cycling conditions	professional and financial) benefited with discounts and even free transport. • Women appreciate more discounted fares/trips than men • Affordable and safe access towards bicycles which allowed women to avoid walking and head loading consequently benefited more.
Aloul et al (2018), Civitas 2020, Kim (2019), Monteiro et al (2016), JRC (2019), Shirhaokar (2019) Deike (2013) Prati (2018)	Harassment/Safety	• Pink parking, pink taxi and pink fares, increase the level of illumination, reinforcement of security presence(police, company staff and private security), use of Wi-Fi inside stations/carriages, surveillance cameras and help points, apps and information to denounce suspicious situations inside the carriages or in the stations; • Removal of bushes and vegetation near of bus stops and eliminate dark access ways, example tunnels and night stops. • Improve the accessibility and safety of public transport stops and vehicles. • Afribike project • Increase women employment in the sector of public transportation • Promote a cycling culture and improve conditions for cycling in urban areas • 'Safer at Night Programme'	• Prevent opportunities and dissuade assailants to make violent attempts on women (rape and assault) • Provide valid options and reinforcing the safety level of public alternatives at a low cost for local governments. • Prevent potential acts of terrorism • Avoid undesired company while getting out of the PT module. • Detention of the offenders and proved evidence against them • Decrease the feeling of being helpless, providing an opportunity for women contact loved ones in or outside the vehicle in the case of an emergency. • Affordable and safe access towards bicycles which allowed women to avoid walking and less probability of being assaulted (robbery, rape, harassment, groping) • More awareness and empathy of women towards these issues. • Awareness campaign of using

			illegal taxis (risks of kidnap, extorsion and rape) and reinforcement of police presence
Aloul et al (2018), Civitas (2020), OCDE (2011), Thynell (2016), Vance &Peistrup (2011), Bastian and Borjesson (2018), JRC Report (2019), Shirhaokar,2019 Hasson & Polvevoy (2011), Peters (2013), Hayati et al (2017), Craig & Van Tienoven (2019), Muhammed et al (2017)	Travel patterns	• Pink parking, pink taxi and pink fares, reduction of the price of monthly passes. Discounted fares for part-time workers and people with low income. • Reconsider transit fare structures to reduce costs for multi-stop journeys • Promote cycling through better conditions for the bicycle users in general.	• Provide valid options and reinforcing the safety level of public alternatives at a low cost for local governments. • A better distribution of women's travel times through their daily routine. • Women appreciate more discounted fares/trips than men, consequently benefited more. • Affordable and safe access towards bicycles which allowed women to avoid walking and head loading
Aloul et al (2018), Civitas (2020), Thynell (2016) Hasson & Polvevoy (2011) Peters (2013) Muhammed et al (2017)	Poverty and Livelihood	• Reduction of monthly passes prices and creation and reinforcement of accessibilities towards women and other vulnerable groups. • Discounts for part-time workers, vulnerable groups and people who have low income. • Increase the accessibility and safety of public transport and	• Women appreciate more discounted fares/trips than men, consequently benefited more. • Vulnerable people due to several limitations (mobility, professional and financial) benefited with a cheaper price on the general pass, discounts, and even free transport. • Access to transportation has been made easier for vulnerable

		vehicles. • Adapt the interior space of PT vehicles to the needs of women • Afribike project • Increase women employment in public transportation	people (pregnant women, women with babies, disabled people, elderly). • Affordable and safe access towards bicycles which allowed women to avoid walking and head loading, providing a green mobility • Financial independence of women, purchasing power could lead to an increased contribute to the country's economy.
Aloul et al (2018). Kim (2019) Shirhaokar (2019) Peters (2013)	Governance and financing of public transportation	• Reducing prices of the monthly passes, raising awareness. • Increase the reliability of the service. • Adapt the interior space of PT vehicles to the needs of women • Increasing women employment in public transportation	• Give awareness to the PT operators towards the reliability aspects of PT modes. • Vulnerable people due to several limitations (mobility, professional and financial) benefited with discounts and even free transport. • Access to transportation has been made easier for vulnerable people (pregnant women, disabled people, women with babies, elderly) • More awareness towards women's needs in the field of public transportation

Table nº2- Problems that women face in public transport. Initiatives and policies that have tried to increase the use of women in public transportation

3- Methodology

Similarly to previous studies, in what concerns to the research context, the methodology to be chosen is essential to evaluate how several factors that could be perceived and even experienced by public transport users could influence their perception of public transportation. Differences between men and women will be analysed. It is essential to analyse the user perceptions as despite several measures are taken in other sectors of society to mitigate disparities between men and women and even in this sector, there are still grievous inequalities that are identified in the literature review in what concerns the sector of public transport that demoralize women to use public transportation as a form of mobility and consequently a way to achieve personal/professional realization.

In what concerns the research design, the method to follow is quantitative, since the survey which will be used in this thesis is a quantitative research technique which is more suitable to proceed to a statistical analysis of the characteristics of a certain population which is more suitable to proceed a statistical analysis of the characteristics of a certain population which is the customers of public transportation, in what concerns to the sample, a high number of replies is required to guarantee the sample to be representative and the relevant to this study. The survey is applied online through Google forms.

The surveys assess mobility experiences of women as well as men in the Lisbon Metropolitan Area and their perception of potential policies that could improve their experiences in public transports. The survey will contain essentially closed answer questions and it is divided fifteen sections, being the first and the last sections, the introductory and the conclusive section, respectively. The remaining thirteen must be answered by the respondents. Most of the variables present in this survey are mostly ordinal, in terms of measure, since most of the questions ask for the degree of concordance of the respondents regarding a battery of statements present in several sections. The nominal variables are more present in the latter sections of the survey and regarding the transport modes that the respondents use in their trips such as the commute and other trips which regard to other purposes.

Since that the majority of authors quoted in this thesis used surveys and in this thesis disaggregated information per respondent is required, it seems that the most suitable method in order to study the issue of satisfaction with public transportation and gender issues in mobility is collecting data through a survey and analysing the differences among public and private transport users and among men and women.

3.1- Survey design

The survey will be essentially composed of closed questions to provide quantitative data and perform statistical analysis. It is divided in fourteen sections. Section II is related to the first part of socio-demographic characterization of the respondents feature variables like gender, the household composition, the possession of a driving license and the quantity of cars existing in the respondent's household. Section III approaches the social roles of the respondents in their household, while the next sections (IV and V) refer to the mobility behaviour and usual habits of the respondents referring to the period before the COVID-19 pandemic situation, concerning the usage of public transportation (frequency, chosen mode, purpose of the trip and how much time they took while commuting). Sections VI to IX approach the main aspects that influence public transport customers towards public transportation such as reliability, security, comfort and other important factors such as the information regarding the service, the fares, satisfaction towards public transportation and measures to improve the satisfaction regarding public transportation. Sections X and XI refer to the most private transport that is used and the latter to the perception of security and measures to increase security in car, then section XII, approaches the satisfaction with car and measures to increase the use of public transportation. Section XIII is concerned about travel well-being. The next section (XIV) includes the loyalty towards public transportation and the personal welfare of both public transport users and private transport users. Finally, in the section XV, it will be featured socio-demographic information regarding the respondents such as the, age, occupation, dependence of others regarding mobility, among others like other issues like the possession of a monthly pass, their occupation, as well as, their income and the place that the respondents live.

Finally, regarding its analysis, these topics will be studied using descriptive statistics and a comparative analysis through the use of parametric and non-parametric tests between several variables that will be crucial towards the objectives and the key questions of this investigation, as mentioned, before.

Before effectively applying the survey and its final version to a larger group of respondents, in order to test and valid this survey, making the study more representative and accurate, a pre-test was conducted, which it is a "*experimental test before applying a survey, which is answered only by a small group of respondents*" (Giddens, 2001). In this study, in this phase, the survey was applied to 34 random respondents in order to trace problems not predicted while constructing this survey and any limitations relating to this survey can be solved before its

online launching into a larger population. Changes were made accordingly to the survey.

Regarding the diffusion of the online survey, it is divulgated through several platforms, mainly through social networks like Facebook, LinkedIn, e-mail, WhatsApp groups/private message, since they have a better reach and consequently a great number of respondents will be essential for the relevance of this study and consequently for its quality. 248 answers were obtained.

The reliability of the survey components was tested with SPSS, using the Cronbach alpha, which is presented in table 69 in the annexes. The data analysis will done using the SPSS/Excel and it will feature the descriptive analysis of the results and a relational analysis that will include variables that will be I explaining user behaviour (socio-demographic to attitudes towards public transportation), because it is essential to design measures that will increase satisfaction towards public transportation and reduce gender inequalities in the sector of public transportation. It will also feature parametric and non-parametric tests in order to test if there are differences between the perception about several aspects of their experiences regarding public transport, if there are differences between men and women and differences between public and private transport regarding their well-being and in household responsibilities also among gender.

As expected due to ethical reasons, the survey is confidential, which means that the identity of the users will stay anonymous and the information that will be collected in the application of the surveys will only be used for academic purposes – the realization of this Master's thesis needed for the conclusion of this Master's programme in Business Administration.

Finally, as mentioned in the 5th objective of this dissertation mentioned before, this dissertation by recurring to the results of data analysis, pretends to evaluate solutions that can potentially increase the degree of satisfaction of public transportation users and formulate new solutions to mitigate the issue of gender inequality in public transportation.

3.2- Case study presentation: Public transport in Lisbon Metropolitan area

The practical case of the public transportation in Lisbon Metropolitan Area, or simply LMA by presenting several data and a brief description regarding the mobility in this territory will be featured in the annexes of this assignment (Annex 1). The case study includes the main public transportation services providers that operate Lisbon which are the Metropolitano de Lisboa (subway) and Carris (buses and tram).

4- Data analysis and Interpretation of the Results

Before starting the data analysis, it is important to recall again that that data analysis will feature the descriptive analysis regarding the questions of the survey present in all its sections. In a latter phase in order to know the relation between several variables important for this study, which is concerned with the comparative analysis, it will be recurred to the use of crosstabulations in order to establish and explain the relationship between accessibilities and the loyalty of PT users as well as the relationship between accessibilities, reliability, functionality, security and comfort/overcrowding with the satisfaction of PT users, concerning also other socio-demographic variables, namely gender, since it is fundamental to know which factors are more important or not to explain why mobility is gendered and for the satisfaction of PT users and how it can be explored for the public transport operators to attract new customers and therefore their revenues and profits.

The information related to the questions refers to the time period when COVID-19 was still absent from our lives and routines, so several aspects such as the cleaning of the surfaces within and outside the transport, as well as, the stations, the social distance which is directly related to crowding, the availability of equipment such as masks, cleaning products to wash the hands in the interior of the stations/bus terminals would be more emphasized in the process of elaborating the survey, which was developed using the online survey platform Google Forms.

4.1- Pre-test

Before proceeding to the data analysis and the interpretation of the results and to trace several inconsistencies and other problems detected by several respondents (a group of 34 respondents chosen randomly). Based on their observations, the main problems that the respondents will be portrayed in this part of the thesis. It was applied the survey in this first phase, with two versions available, one in Portuguese and the other in English.

The main problems that the respondents identified in this survey was the extent of the survey that took from 10-15 minutes, so it was crucial to make all questions as “required”, in order to prevent that people would give up the survey at a certain point, being imprecise for its ultimate purpose. It was observed also several questions relating to the language of the survey, namely in the Portuguese version, and specifically a sensitive issue in the first question of this survey which formerly was ´Prefer not to say/Prefiro não dizer´, which was replaced by the option 'Other/Outro' considering that the survey will be answered by the members of the

transgender community.

The tool that was used regarding the process of the pre-test was the Cronbach Alpha with the purpose to know if the survey is measuring appropriately the perception of public and private transportation users regarding their transport modes and to check which the factors that contribute more to a gendered mobility are, mainly the reliability, security, comfort and services verified in public transport and also the security regarding private transports, satisfaction and intention to use the public transport, as well as the issues linked with the loyalty towards public transport and the well-being verified in both private and transport modes.

4.2-Descriptive Analysis

After the results were obtained, the next process was the analysis of the answers of random 248 participants that were collected through Facebook (personal profile and several groups about the Metropolitan Area of Lisbon), LinkedIn (personal profile and groups) and through the collaboration of other people that shared this survey among their fellow work colleagues, friends and other connections. The analysis is threefold.

The first step is dedicated to the descriptive characterization of the sample which includes the socio-demographic and socio-economic characterization of the individuals, their mobility habits, their current perception of mobility in public transport and private transport, measures to improve their experience in both means and to improve the conditions of public transportation in order to acquire new users and keep its regular users.

In the second group, it will be featured the relational analysis between several groups of variables and the correlations that are essential to answer the key-questions regarding this dissertation and finally, there are parametric and non-parametric tests (e.g.: ANOVA, T-Test, Levene's test and the Whitney Test) to compare the satisfaction and loyalty between public transport and private transport users and the different perceptions of public transport users on the service they experience.

4.2.1 Sample Description (Section I, II and III)

In what concerns to gender, *being illustrated by the table 18, present in the annexes*, this survey was answered by most female respondents (58%), male respondents are about 40%. Respondents who answered "Other" were only 1,23%. In what concerns to the household composition, according to table 18 present in the annexes, most of the respondents (39%),

answered that their household was composed with more than one adult without children.

Then an important part of the respondents answered that their household is composed by "one adult without children" (29%). It is observed that an important percentage (25%) of the respondents answered that their household is composed by more than one adult with children and only 7% of the respondents answered that their household is composed by one adult with children.

In what concerns to the possession of a driving license, *according to the table 18 of the annexes*, the predominance of respondents that have a driving license is quite illustrative (90%) and only 10% of the respondents answered that they don't have a driving license.

Regarding the possession of a car in their household, being summarized in the table 18 in the annexes, many of the respondents (37%) stated that they have two cars available for the attendance of the household needs. There was also an important percentage of 33% of the respondents that they have only one car to cover the household needs for mobility. There is an important number of respondents, although being a minority (13%) that do not have a car for their household mobility.

Regarding the household activities, presented in the table 3 in the annexes, the majority of the respondents (46%) answered that they disagree about being the main responsible for the transport of other people such as their parents or kids, to their work/school/activities. The majority of the respondents (35%) also answered that they are the main responsible for the shopping activities in their household, as well as, they also predominately agreeing (35%) that they sacrifice their personal time to offer assistance in their household, as well as they also consider mostly (35%) that they agree about sharing the assignments required for the maintenance of the household with other adults living in their house. Finally, 46% of the respondents agree that it is easy to move to their destination when they need to take care of a household emergency.

4.2.2 Sections IV and V- Mobility behaviour and usual habits

Regarding the mobility habits of the respondents, which are present in the table 4, most of the participants of this survey answered that they never use public transportation (49%). Concerning the public transport users, most of them use public transportation 5-7 considering a weekly basis (33%) and an important percentage of 11%, use public transportation 1-2 times per week.

Concerning the public transport users, present in the table 4, the majority of the public transport users use the subway for their trips as well as the bus as the main public transport modes which are used by the public transportation users (38%), being the other modes used although with less frequency being the train (20%) and the ferry-boat (4%).

Concerning the purpose of the trips taken by public transport, according to the table 4, the majority of the participants used the public transportation for their professional (60%) and academic purposes (23%), being that 11% of the respondents use the public transportation for other activities (personal and family life).

Finally regarding the time spent in the trip in the public transportation, according to table 4, the respondents spent in their majority from 30 to 60 minutes on their one-way trip towards their work, school, personal/family life (50%), while 34% of the respondents spend less than 30 minutes in their one-way trip by public transportation (subway, train, ferry-boat and bus). It is relevant to notice that 17% of the respondents consider that the time spent in one trip in their public transport mode is more than one hour.

Public transport

4.2.3 Section VI- Reliability, Functionality and Accessibilities

Regarding the reliability, functionality and accessibilities, *according the table 5 present in the annexes*, the majority of the respondents slightly agreed that the time they were waiting for the next vehicle was acceptable (36%), even though 22% of the respondents, slightly disagreed or even disagreed with this statement (22%). Relating to the time of the trip, most of the respondents (35%), slightly agreed when asked if they were arriving fast from their departure point to their desired destination.

In what concerns to the frequency of the schedules, 32% of the respondents consider that the frequency of the schedule was acceptable, but an important percentage (25%) of the respondents disagree with the statement, considering that should more trains/buses/ferries during a certain period of time. Regarding the variability of the waiting time between transports, 27% of the respondents slightly agreed that there was a lot of variability. Also 33% of the respondents slightly agreed that they were arriving to their destinations at the time expected, despite 28% disagreed of that statement.

In what concerns to the technical problems, 47% of the respondents disagree when they were questioned if they never had delays and 30% of the public transport users consider that in

the case of happening technical problems, the information regarding them, is not properly communicated to the passengers, disagreeing with that statement.

Regarding the transfers, 31% of the users agreed that they did not have to make many transfers while using their most used transport mode. 31% of the respondents slightly agree that the time that they spend changing mode and line was short, although, 26% of the respondents slightly disagreed with that sentence.

Regarding the connections, 36% of the respondents slightly agreed that they have nearby connections/accesses to the public transport mode, also slightly agreeing (39%), that they have available connections to their destination and 42% of the respondents slightly agree that their most used transport mode has connections to other public transport modes.

It is important to notice that 31% of the respondents consider that it is more advantageous to travel to certain areas of the cities like historic areas and areas that restrict the circulation of cars.

Finally, considering the accessibilities and navigation towards the public transportation, both in vehicle and the stations, 41% of the respondents agreed that their mobility and orientation inside the stations (subway/train) and stops(ferry and buses) was easy, while 37% slightly agreed that it was easy to get on and off this mode, although 30% of the respondents disagreed that it was easy to get on and off from their most used public transport mode with baby trolleys, shopping bags, luggage or wheelchairs.

4.2.4 Section VII- Security

Regarding the existing security in public transportation, according to table 6, it was observed that 66,5% of the public transport users agreed that their public transport mode is safe during the day, but in the night, it diminishes to 30%, increasing the negative categories (disagree and slightly disagree). 39% of the participants agree that they feel safe both walking for the station and waiting for the transport in the station. The transport users in their majority agree that their friends were not worried about them using their transport mode, considering it safe with percentages of 30% and 35%, respectively. 38% slightly agree of the public transport users consider that the stations and stops were well illuminated.

The passengers also consider that the patrolling around the stations/stops should be reinforced, since 52% disagree, also considering that campaigns about security (32%) and surveillance in this transport generally (37%) and in problematic areas of the city/suburbs should

be seriously reinforced (35%).

It is also important to say the public transport users are slightly uneasy towards the environment around the stations/stops (31%) and the response in case of an emergency should be more efficient. But the public transport users consider the public transport relatively safe since they agree that the usage of their favourite mode was not preventing them of visiting friends and family (30,24%) and most of the public transport users consider that they weren't assaulted/robbed/harassed while outside and/or inside the public transport mode.

4.2.5 Section VIII- Comfort and Services

Regarding the comfort experienced in public transportation, *according to table 7 in annex*, public transport users considered that the offer of seats was definitely not enough (38%) and they should be more comfortable presenting by a great predominance of negative answers in both categories(disagree and slightly disagree). The passengers also with an illustrative 81% demonstrated that they agree that there are too many people in the transport mode, especially in the rush-periods. 28% of the public transport users also consider that the bus providers should improve the cleanliness of the transport mode, as well as, the stations, considering that they feel relatively comfortable while travelling with people that don't know (28%), although they mostly don't have a clear opinion about it (31%).

It was observed that 40% of the public transport users considered that they don't have a clear opinion (neither agree, nor disagree) about using their transport mode with children, although there is a slight tendency for public transport users to don't feel bothered by children (20%) being also important that public transport users consider that is relatively complicated (37%) using the public transport while carrying shopping bags or luggage.

Finally to close the discussion about the comfort conditions in public transport, the public transport users mostly don't have a clear opinion (39%) about travelling surrounded by people, although they slightly agree (30%) that in their predominant transport mode slightly agree that surrounding people, noise and smells as unpleasant.

Regarding the services provided by the public transportation providers, present in the table 8, in annex, the public transport users slightly agree (30%) that the staff present in the stations, platforms and in the transports are always available for helping the, therefore the public transportation provider should improve in that aspect. The public transportation users (41%) also consider strongly that they should be informed about delays regarding the circulation of the public transport. Concerning the apps for their transport modes, the public transport users do not

have a clear consideration about their easiness (24%) and about their accuracy (28%), although that the apps are an aspect that the public transport providers should improve.

Regarding the monthly pass and the acquisition of tickets, public transport users mostly agree that the monthly pass is affordable considering their needed and wanted trips (43%), slightly agreeing that the price of ticks is reasonable (29%) and agreeing about the easiness of obtaining tickets (35%), considering also that they are spending less while using the monthly pass such as Navegante, for example, is more economic in comparison regarding the expenses related to their own vehicle, such as fuel and maintenance (54%).

4.2.6 Section IX- Perceived satisfaction and measures to improve the safety in the public transport

Concerning the perceived satisfaction concerning public transportation, present in table 9, in annex, although most of public transport users consider that in the overall, they slightly agree that they were satisfied with this transport mode (43%), consider that there are a lot to change in their favourite transport mode (45%).

That is represented that the public transport users slightly agree consider that the services provided correspond to their expectations and needs (28%), and they slightly agree that their favourite transport mode is the best mode for their mobility (36%). Overall, public transport users slightly agree that overall, there are more positive aspects than negative aspects, while using their favourite transport mode (38%), also slightly agreeing that their favourite mode, in fact, corresponds to their mobility needs (47%).

In order to improve the safety in the public transportation, according to table 10 present in annexes, public transport users agree that should be an application in the phone to contact transport providers/police towards dangerous situations (54%), as well as contact posts (65%), towards the necessity of the staff guarantee the safety of the passengers (62%) and the existence of Wi-Fi connection in the stations that the passengers could use to alert people that they know while facing an emergency (56%). Public transport users also agree that the mode should have flexible schedules to fit passengers' needs (61%) and that public transports should be able to let passengers at any point of the route in order to avoid dangerous situations (40%).

Despite that, public transport users disagree about paying more for contact posts and wi-fi (36%) and having access to car-sharing services combined with the public transport that they mostly use. Regarding the usage of carpool systems and other transports, public transport users agree that they feel safer using Uber, Taxify and Cabify (36%) and by car (57%), although

disagreeing about feeling safe while using carpool system platforms at any time of the day (29%).

Finally, the public transport users agree that they feel safe travelling by car at any time of the day (31%).

Private transport

4.2.7 Section X- Most used private transport

Regarding the private transport analysis, present in the figure 4 in the annexes, the private transport users use with a large predominance their own car (86%), followed by walking towards their destination (7%).

4.2.8 Section XI- Perceived security in private transport

In what concerns the perceived feeling security in their own cars, which is present in table 11 in the annexes, private transport users agree that they feel safe in their own car in both day (85%) and both night (73%) and there agree with a clear evidence that they prefer to travel in their own car than by public transportation (86%).The usage of car also was not preventing private transport car users to visit friends and family (82%).

Regarding the security in spaces, the majority of car users agreed when asked if they were feeling safe while looking for a parking spot in their area(77%) , also agreeing the illumination of parking areas is appropriate(54%), although they consider that the presence of the police and the parking lot providers should be more visible in the parking lots that they use for parking their vehicles (58%), although also agreeing that the environment where they park their cars inspires them towards feelings of safety (41%). Car users also consider that their friends mostly agreed that the car is safe (64%), and they were not worried about them using the car at night-time (57%). Car users in their absolute majority considered that they have not any negative experiences regarding the car, predominately disagreed with those statements.

Regarding the measures in order to increase the security when using car, according to table 12 present in the annexes, the car-users disagree that they would feel safe using pink-parking lots when they are alone (51%) or with other adults (53%) and even by using pink-taxis and carpooling platforms like Uber driven by women compared to their own car (52%). More effective measures to increase security in private transport according to car-users are reinforcing the illumination nearby their usual parking spot close to their house (66%) and increasing the visibility of the environment around parking areas (66%).

4.2.9 Section XII- Satisfaction with car and measures to increase the use of public

transportation

According *to table 13, in the annexes*, which considers the current satisfaction with car as transport mode, seems that car-users agreed with more significance (60% and more) to almost every point that was contemplated in this part, although they consider that there aspects to improve regarding car as their main transport mode, agreeing that they didn't want to change anything about the car as a transport mode (48%).

Regarding the parking lots that car users use for the purpose of parking, according to the figure 5,which is present in the annexes, the majority of car users the on-street-free parking (61%), followed by the private parking within their housing (garage) with a percentage of 31% of the total of the respondents.

Finally relating to the measures that could make car-users use more public transportation, being present in table 14, is that despite not having a clear opinion, there is a tendency of the car-users (26%) to agree that they would use more the public transport, if they could travel easier with their children in it, also agreeing that they could use more the public transport if they could travel easier with shopping bags and other materials (32%), having lower fares for several trips during the day (43%), better accesses to their destination (63%) and better connections to railed public transports like the metropolitan and train (51%) and by having more real-time information about the circulation in order to better plan their trips (49%). A large majority of car-users is open towards the usage of public transport, by disagreeing about the statement “I would never use public transportation” (64%).

4.2.10 Travel well-being and personal welfare

Section XIII- Travel well-being

Regarding the travel well-being, according to table 15, the participants mostly agreed that travelling by their current mode was enjoyable (53%), although they relatively were not pleased about travelling in their mode in rush-hours (26%). Regarding the personal time, the public transport and car users agreed that the mode was giving them valuable ‘me time’ (36%) and giving them time to spent with the people living in their household, shopping and personal activities (29%). Public transport and car users also agreed that their mode was the best option that they have available (54%) and travelling by it was not affecting their mood (36%), although they definitely could leave their transport mode for another transport mode available (26%).

Section XIV- Loyalty and personal welfare

Concerning the loyalty towards the most used transport mode before the COVID-19 pandemic, according to table 16, public transport users and car users agreed that even that situation they consider that their most used transport mode, was still increasing their quality of life (37%), as well as, they still rely on this mode for their mobility (44%), also agreeing that their most used transport mode satisfies their mobility needs like no other does (25%). The majority would also agree that they would recommend their favourite mood to their family, friends, and colleagues (40%). Finally, most of the participants agreed that they continue using this mode nowadays, considering the epidemic situation through the world (50%).

Considering their personal welfare, present in table 17 in the annex, the majority of respondents agreed that they were satisfied with their job condition (37%), their health condition (50%), their life condition (39%) and regarding the location of their house (52%). Respondents slightly agreed about how that their life conditions were excellent (45%) and how about they were extremely satisfied with their life (45%). They also slightly agree that in most aspects, their life is close to their ideal of living (35%).

4.2.11 Socio-demographic characterization II

Section XV- Socio-demographic characterization II

In what concerns the location of the respondents, the majority of the respondents is from the municipality of Lisbon (38%), followed by participants from rural areas in the south bay of the Great Lisbon Metropolitan Area with a percentage of 27% and by the participants that live in the urban area situated in the north bay of the Great Lisbon Metropolitan Area (e.g:Amadora, Oeiras, Sintra, Cascais), with a percentage of 20%, according the information present in the table 18.

Regarding the possession of a monthly pass for public transportation, according to table 18, most of the participants answered that they do not have a monthly pass for public transport for Lisbon and Oporto Metropolitan Areas (59%). 41% of the participants, answered that they have, in fact, a monthly pass for the public transport within the metropolitan areas and/or inside the cities.

In what concerns to the age group of the participants of this study, according to table 18, most of them have from 25 to 34 years old (40%) followed by participants who have from 35 to 44 years old (22%). The third age group most represented is the 45-54 age group (14%).

Regarding the dependence on other people in what concerns the mobility, according to table 18, there is a smashing evidence that the study participants do not rely on other people in what concerns to their mobility (83%). Only 17% of the respondents said they that they depend on

someone regarding their own mobility.

Concerning the employment state in the period prior to the COVID-19 pandemic, according to table 18, which started in Portugal in the month of March, a large majority of respondents were fully employed (72%), followed by the people who were studying (14%) before the arise of the epidemic situation through the world.

Finally regarding the monthly net income of the participants, most of them (34%) answered that they earn from 1000 to 1500 €, followed by the participants (30%) who claimed to earn from 500 to 1000€ and a significant part of the participants (16%) whose net income in less than 500€, which is significantly below the minimum wage in Portugal (approximately 655€).

In sum, the table nº18 present in the annexes makes a brief review of the information regarding the socio-economic and socio-demographic characterization of the respondents.

4.3-Analysis of user's perceptions

To test the differences of the means of the replies of the public transport and private transport users, the t-test for the equality of the means was employed. The perceptions of the users on their travel well-being, loyalty towards the transport and personal welfare were analysed to identify differences between public transport users and private transport users. Out of the 248 replies, 121 users never use public transport and 127 use, at different weekly frequencies, public transport.

4.3.1- Differences in the Travel well-being, loyalty towards most used transport and personal welfare between public and private transport users

4.3.1.1-Travel well-being of public and private transport users

Regarding the travel well-being of private and public transport users, the table 19 in annex, shows the means values of the respondents to the travel well-being statements. The first column shows the analysed well-being statement, the second column the number of replies per group, the fourth column indicates the mean values per group (column 2) and column fours shows the standard deviation of the replies of the respondents. Regarding the means of the travel well-being, all the means are more positive for the private transport cars than to public transport users.

Tests

Regarding the interpretation of the table 20 that will be in annex, according to the results of the Levene's Test, T-Test and Mann-Whitney Test, there is statistical evidence that we can reject the null hypothesis (H0) which means that the means of public transport users and car users are equal regarding the following variables:

- "Travelling by this mode was enjoyable"; (Mean Rank Public transport: 92,22; Private transport: 156,88)
- "Even in rush-hours, I was pleased with this mode" (Mean Rank Public transport: 92,62; Private transport: 156,46)
- "Travelling by this mode was giving me valuable personal time" (Mean Rank Public transport 99,28; Private transport: 149,35)
- "Due to the long time I was spending in this mode, I didn't have time for the people living in my household, shopping and other activities" (Public transport: 136,44; Private transport :109,68)
- "This mode was the best option I had available"; (Mean Rank: Public transport: 108,52; Mean Rank Private transport: 139,49)
- "Travelling by this mode was not affecting my feelings" (Mean ranks: Public transport: 141,52; Private transport: 106,61) ,since their p-value is inferior to the standard value of 0,05, which is the standard value that influences the decision about reject/don't reject the null hypothesis, considering that the confidence interval is 95%. These results mean that there are significant differences in the perception of the public and private transport users and that private transport users indicated better rates in the statements of travel well-being.

On the contrary, we can accept the null hypothesis (H0) that the means are equal in the variable "I would never leave this mode for another transport mode", since its value (0,103) is superior to the p-value and there is statistical evidence that the mean between public and private transport users is equal.

4.3.1.2- Loyalty towards the most used transport mode

In what concerns the aspects of the loyalty towards the most used transport mode, according to table 21 present in annex, the car users answered more frequently that using car was increasing their quality of life (4,22), compared to the public transport users (3,22). Private transport users also considered that they could rely on car for their mobility than public transport users (3,71).

Car users also responded with higher rates that they would recommend their transport mode (4,09), than public transport users (3,77) and that no other mode (public or other private modes) could satisfy their mobility needs (3,47). Car users more frequently answered that car was the only available mean of transport that they had (3,19) and they would continue using this mode

today (4,36).In sum, the results of the private transport mode(car) are more positive when compared to public transport users regarding their loyalty towards their most used transport mode.

Regarding the interpretation of the table 22 of the test results which is featured in the annexes of this assignment, it was observed that there is no statistical evidence to consider that the means of the public transport users and car users regarding their loyalty towards their most used transport mode are equal in the variables:

- "Using this mode was increasing was quality of life"; (Mean Ranks: Public transport: 95,23; Private transport: 153,67).
- "I could rely on this mode for my mobility"; (Mean Ranks: Public transport: 102, 36; Private transport: 146, 06).
- "I would recommend this mode to others" (Mean Ranks: Public transport: 112,19; Private transport: 135,57).
- "No other mode could satisfy my mobility needs that well, as this one" (Mean Ranks: Public transport: 109,36; Private transport: 138,59) and
- "I continue using this mode today" (Mean Ranks: Public transport: 116,06; Private transport: 148,92), since their p-value or sig (2-tailed) is inferior to 0,05, consequently existing differences between the mean of public transport and car users.

On the other side, in the variable "This mode was the only available means of transport that I had", there is statistical evidence, since 0,102 is superior to the p-value (0,05) and consequently we can accept H0, which that there is no differences between public and private users.

4.3.1.3- Personal welfare

According to the interpretation of table 23, in the annexes, it was verified that the cars users were more satisfied with their job condition (3,61), health condition (4,21) and their life condition (4,16). Car-users have also considered they were more satisfied with the location of their house (4,30), as well as classified their life conditions as excellent (3,83). Finally, car-users were predominately satisfied with their life than public transport users (3,92) and considering that in most ways their life is closed to their ideal expectations (3,67).

T-Test

Regarding the results of the T-test and the Levene's test for the equality of the variances present in the table 24 in the annexes, it was observed that in the following variables:

- “I am satisfied with my job condition” (Mean Rank: Public transport:112,30; Private car: 135,45)
- “I am satisfied with my life condition” (Mean Rank: Public transport:111,81; Private car: 135,97)
- “The conditions of my life are excellent” (Mean Rank: Public transport:112,22; Private car:135,54)
- “I am extremely satisfied with my life” (Mean Rank: Public transport; Private transport:

And in the variable “in most ways my life is close to my ideal” (Mean Rank: Public transport:110,65; Private car:137,22) , there are differences between public transport and car users regarding their personal welfare, so we reject H0.

4.3.2-Public transport and Gender perceptions

4.3.2.1-Reliability

T-Test

Regarding the results of the table 25, which indicates the mean differences between men and women regarding the mobility, demonstrating that men have a slightly better opinion about the existing reliability. Regarding the results of the T-Test, that are featured in the table 26, it was observed that there are no significative differences between man and women regarding their perception towards the reliability aspects in the public transport, consequently we retain H0.

4.3.2.2- Security

It was observed in the tables 27 and 28, present in the annexes, that there are statistically relevant differences in the means towards men and women in the following variables.

- “I was feeling safe using this mode at night” (Mean Ranks: Male: 73,74; Female:58,08)
- “My friends/family thought this mode was safe” (Mean Ranks: Male: 72,70; Female: 58,72)
- “Campaigns about awareness towards security were satisfactory” (Mean Ranks: Male:76,00; Female: 56,71)
- “The response in case of an emergence/attack by the police and the transport operator was quick and coordinated” (Mean Ranks: Male:77,86; Female: 55,58)
- The surveillance system in the stations/stops of this mode was satisfactory; (Mean Ranks: Male: 77,83; Female: 55,59)

- The surveillance system made me feel safe when I used this mode even if I am in a problematic area of the city and/or in the suburbs; (Mean Ranks: Male: 76,44; Female: 56,44)
- The environment around the stations stops of this mode makes me feel safe; (Mean: Male:74,89; Female: 57,39)
- "Using this mode didn't prevent me from travelling at night by this mode to see my friends and family"; (Mean Ranks: Male: 72,69; Female: 58,72)
- "I had felt harassed while waiting in the station/stop for the mode I use the most" (Male:69,10; Female:55,60)

Table 27, in the annexes, shows that in most of the items, men have better results (except when it concerns to assault/robbery inside the public transport mode) regarding the security components when compared to women.

4.3.2.3- Comfort

It was observed, according to the results of the hypothesis, graphically represented by table 30, that there are no significant differences in all the variables that relate to the comfort of public passengers, depending on the gender, because the p-value in all the variables is superior to 0,05, so we don't reject the null hypothesis indicating there is no significant differences between men and women regarding the comfort conditions in the public transport. Table 29 present in the appendices demonstrates that men have better results regarding their perception about the existing comfort conditions in the public transport modes.

4.3.2.4- Services

Regarding the results for the differences between men and women regarding the services in the public transportation that are featured in the annexes of this assignment in the table 32 in the annexes, we observed that the p-values of all the variables regarding the services present in their most used public transport mode, consequently we don't reject the null hypothesis, there is a statistical evidence to infer that there are no significant differences in the means of men and women regarding their opinion about the services present in the public transport. Regarding the means of the services present in the table 31, we verified that women have better results than men in several variables like the usage and the accuracy of the applications, the sympathy of the staff and the affordability of the monthly pass and the affordability of the tickets.

4.3.2.5- Perceived satisfaction with public transport

It was observed that in all variables regarding their perceived satisfaction have their p-

values superior to 0,05, consequently we don't reject the null hypothesis, so there is statistical evidence to consider that there no significant differences in the means between men and women who use the public transportation. The Table 33 summarizes the mean differences between men and women, women have better results considering that their most public transport was the best mode for their mobility, since it covers their mobility needs.

4.3.2.6-Measures to increase sense of security

Concerning the results of the t-test for the equality of the means, that are present in the annexes of this dissertation in the table 36, it is concluded that there are mean differences between men and women regarding the measures to increase safety in the following variables:

- At night, the mode should have flexible schedules to suit passenger's needs (Male- 50,35; Female- 72,29)
- "There should be contact posts in the stations to contact the public transportation provider and the police towards dangerous situations in order to increase the existent feeling of being safe" (Male: 53,49; Female: 70,39)
- "There should be Wi-Fi connection at the station/stop and the mode I use the most so that I contact people that I know in case of emergency" (Male:53,38; Female: 70,46)

  So, regarding the measures to increase the security conditions in the public transport, there are differences between men and women.

Regarding the mean differences between men and women, present in the table 35 in the annexes, women are more receptive towards the installation of several infrastructures and services in order to increase their perception of safety in the public transport and don't mind to pay more for increasing their safety in the metro/ferry-boat/train and bus.

4.3.3- Private transport and Gender

Regarding the results of the t-test, it was observed in the table 38, that all the variables regarding the perceived security in the car as a transport mode present no significant differences between the means, since all the p-values observed were superior to 0,05, so we don't reject the null hypothesis. Consequently, there are no differences between men and women that use their own car, regarding their perception of safety. According to Table 37, both men and women feel safe in the car, with no significant differences.

Regarding the results of the T-Test for the equality of means, which is featured in the table 40, we observed that in all the variables concerning the measures to increase the safety in

the car as a transport mode that all the p-values were superior to 0,05, consequently there aren't statistically significant differences regarding the men and women means, so we don't reject the null hypothesis and there are no significant differences between men and women, who use their own car, regarding the measures to increase safety in this transport mode. The only difference is that women consider that they would feel more secure if they have improvements in the visibility and illumination nearby parking areas, being represented by the tables 39 and 40.

In what satisfaction with car as a transport mode is concerned, it was verified that in all the observed variables that there are no statistically differences between the means of men of women regarding their perceived satisfaction towards the car as their most used transport mode, consequently we don't reject the null hypothesis (H0). Exception was the variable "This was the best mode for my mobility" (Mean Ranks: Male: 46,54; Female: 57,04), which showed there are differences between men and women, since women consider more than men that their car was the best mode for their mobility, according to the information present in the tables 41 and 42 in the annexes of this assignment.

Finally considering possible measures that could stimulate the use of the public transport towards the regular car users, it was verified according to the results of the t-test, graphically represented by the table 44, that all variables regarding measures that would attract the car users to use the public transport presented their p-value superior to the standard value (0,05). Consequently, there are not significant differences in the means of men and women regarding the measures to increase the use of public transportation. Regarding the information present in the table 43, women would travel more by public transport if most of the components regarding these measures were fulfilled.

4.3.4- Household activities

Regarding the household activities and gender, it was verified by using Levene's test, the T-Test for the equality of the means, present in the table 46, that there are significant differences between men and women in what concerns to the shopping activities (Mean Ranks: Men: 111,79, Women: 133,53) and sharing the responsibilities of the household with other adults (Mean Ranks: Men: 141,99: Women: 112,02), so we reject H0 of means equality in these variables. The table 45 demonstrates the mean differences between men and women regarding the household activities.

Regarding the differences of the household activities and private/public transport, we verified that according to the Levene's test for the equality of variances, the T-Test (for the equality of the means) present the table 48, that there are statistical differences between the

private/public transport and their household activities in the following variables:

- “I am the main responsible for the transport of other people to their work/school/activities (children, parents, husband/wife)”. (Mean Ranks: Public transport users: 111,23; Private transport users: 138,43)
- “When I need to treat a household emergency, it is easy to move to my destination”. (Mean Ranks: Public transport users: 105,01; Private transport users: 144,96)

The table 47 demonstrates the mean differences between public and private transport users regarding their responsibilities in their households.

4.3.5- Travel well-being, loyalty towards transport and personal welfare and Gender

4.3.5.1- Travel well-being and Gender

Regarding the travel well-being, according to the table 49 in the annexes, the men have better scores regarding to their travel well-being when compared to women in the components of the travel well-being, so in the next step it will be verified if these differences are statistically relevant. After computing the components of the travel well-being and gender, it was observed according to the results of the T-Test supported by the Levene’s test present in the table 50, that there were no significative differences between men and women, regarding their travel well-being, so the null hypothesis of equal means (H0) can’t be rejected.

4.3.5.2- Loyalty towards transport and gender

Regarding the loyalty towards the most used transport and gender, it was observed that men have better results in all the components of the loyalty towards their most used transport, except in the statements “No other mode could satisfy my mobility needs well as this one” and “This mode was the only available means of transport I had”, evidenced in the table 51.

In order to check for statistical relevant differences between men and women regarding their loyalty towards their most used transport mode, it was used the T-Test with support of the Levene’s test, it was observed that there were significative differences between men and women in the statement “This mode was the only means of transport I had”. (Mean Ranks: Men: 111,65; Women: 131,75), so there is statistical evidence to reject H0 in this statement, according to table 52.

4.3.5.3- Personal welfare and gender

Finally, regarding to the differences regarding the personal welfare and gender, it was observed that women were more satisfied with their health condition, life condition, the location of their house, the conditions of their life, considering that their life is close to their desired ideal when compared to men which are more satisfied with their job condition and extremely happy with their life in general, as summarized in the table 53 and 54.

4.3.6-ANOVA analysis

Regarding the ANOVA analysis we are going to use the variables "Measures to increase security" from public transportation and the approximate monthly net income, the variables "reliability" with the time spent in the trip of public transportation and the variables travel well-being, loyalty towards public transport and personal welfare with the variable "which public transport".

4.3.6.1- Measures to increase security (Public transport) and monthly net income

Regarding the results of the Levene's test, the one-way ANOVA alongside with the Tukey's test results, that are featured in the table 55 in the annexes of this assignment, there is statistical evidence to consider that there are no differences between the populations regarding the measures to increase the security in the public transport and the variable monthly net income.

4.3.6.2- Reliability and time spent in the public transportation

Regarding the ANOVA one-way test, Levene's test and the Tukey test results, that are graphically demonstrated in the table 56, it was observed that there were differences in the means populations in the variables "I was arriving fast from my departure point to my destination" and "I didn't have to make many transfers using this mode", although in the Tukey's test, the p-value is superior to 0,05 and consequently, there are no differences between these variables and the time spent in the public transportation.

4.3.6.3- Travel well-being and most used public transport

Regarding the mean differences between the populations of the variables of the travel well-being alongside the most used public transport, it was observed that according to the ANOVA one way test, Levene's test and Tukey's test, represented in the table 57, that there were no statistical differences between the population means of these variables.

4.3.6.4- Loyalty towards most used public transport

Regarding the loyalty towards transport and the most used transport, according to the results of Levene's, Tukey and in the ANOVA tests, present in the table 58, it was verified that despite there were differences between the population's means in the variables "I would recommend this mode to others" and "This mode was the only available means of transport I had". Therefore, after checking the results of the Tukey's test, it was confirmed that there were no significant differences between the populations

4.3.6.5- Personal welfare

According to the results of the Levene's test for the homogeneity of variances, ANOVA one-way and the Tukey's test, represented in the table 59, there is statistical evidence to conclude that there are no significative differences between the population means observed in these sets of variables. Consequently, the decision is to retain h0, which means that the population means regarding the most used public transport and the personal welfare do not have significative statistical differences.

4.3.6.6- Services and travel well-being

After relating the statement "Travelling by this mode" with the statements present in the services regarding public transports, according to the table 60, it was observed that with the recourse of the Levene's test, ANOVA and the Tukey test, there is statistical evidence to conclude that there were no significative differences between these populations.

4.3.6.7- Services and loyalty towards public transport

After associating the statement "This mode was the best option I had available" with the statements related to the existing services in the public transports, according to table 61, it was observed that after making a battery of hypothesis tests (Levene, ANOVA and Tukey), that there are no significative differences regarding these populations and H0 should be retained.

4.4- Crosstabulations

In order to answer to the remaining key questions (2,3,4,5,6 7 and 8), since the first question was already answered in the mean differences (T-Test, Mann-Whitney and Levene's Test), crosstabulations were used alongside with the measures to check associations such as the tau-b(τ), tau-c(τ) and Gamma(γ) in ordinal variables), which will be featured in the annexes. So, it was observed that:

For the second key-question ("Perceptions on comfort has an impact on the satisfaction of

public transportation users", according to the table 60, it was observed that after using crosstabulations between the variable "Overall I was satisfied with this transport mode" with all the variables from the comfort group (present in the annex) that there was a positive association statistically significant relationship which means the more the public transport users answer that they agree with positive connotations regarding comfort, the satisfaction of public transport users will increase.

On the other side, regarding the negative statements regarding comfort such as "I didn't feel comfortable travelling with people that I don't know" (γ= -0,332), it negatively influences the satisfaction of public transport users). Regarding services, which are represented in the key-question "Perceptions on services have an impact on the satisfaction of public transportation users by crossing the variables of the services thematic, according to the table, present in the table 61, it was verified that the satisfaction regarding services has a positive relationship with the overall satisfaction and it is statistically significant, so the satisfaction regarding services is important for the overall perceived satisfaction of public transport users.

In the third key-question "Perceptions on security existing in the public transport, as well as in the stations, is crucial for the loyalty for the public transport users", it was observed that after doing the crosstabulations between the variable "Overall I was satisfied with this transport mode" and the security related variables in public transport, that in most of the security variable regarding the sense of security, they influence positively the satisfaction of public transport users regarding security. On the other side, negative experiences (assault/robbery/harassment) experienced inside or waiting for the metro/bus/ferry decrease the satisfaction of the public transport users regarding public transport, as evidenced in the table 62 in the annexes.

In the key-question 4, which is "Perceptions on functionality/reliability has an impact on the satisfaction of public transport users.", it can be observed most of all the variables regarding the reliability influence positively the overall satisfaction of public transport users being statistically significant. Therefore in the variable "There was a lot of variability in what concerns the waiting time", despite of having a positive influence regarding the satisfaction of the public transport users, it is not statistically significant to increase the overall satisfaction of public transport users, so it can be affirmed that reliability, functionality and accessibilities are important to the satisfaction of public transport users, as represented by table 63.

For the key-question 6, concerned about the importance of the reliability/accessibilities and functionality of the public transport towards the loyalty which was represented by the

statement “I could rely on this mode for my mobility”, it was observed that most of the reliability statements influence positively the loyalty towards public transport, for the exception of the variable “There was a lot of variability in what concerns the waiting time” which has a negative influence towards public transport users loyalty, but the association is not significant statistically, according to the information present in the table 64.

In the key question 7 (“Comfort is important for increasing the travel well-being among public transport users”), regarding the relationship between comfort and travel well-being represented by the statement “Travelling by this mode was enjoyable”, it was observed that most of all the statements regarding the comfort perception of the public transports have a positive association being also statistically significant. Therefore, statements like “I didn’t feel comfortable with people I don’t know”, for example negatively influence the travel well-being of public transport users, which is represented by the table 65.

In the key-question 8 (“Security existing in the public transport, as well in the station is crucial for the loyalty of the public transport users”), in sum, that the variables “ I was feeling safe using this mode during the day”, “I was feeling safe during the night at night”, “the station/stops were well illuminated, “the environment around the station/stops of this mode makes me feel safe” and “Using this mode didn’t prevent me from travelling at night by this mode to see my friends and family” have a positive association with the loyalty of public transport users, being also statistically relevant, as evidenced in the table 66.

Regarding the key-question 9 as seen previously (c.f p.61 and tables 37 and 38), despite there were no significative differences between men and women’s security concerning the private car, women mostly that they feel safer inside the car during the day, while men feel slightly safer during the night. Women are most prone to travel by car at night being more concerned the illumination conditions. Regarding negative experiences, they are more subject of being harassed while walking to/from the point they have parked their car and of being robbed/assaulted, while waiting for a friend’s ride. Finally, in the key-question 10 regarding to the influence of services in the travel well-being and public transport users, there were no significative differences between these populations, said previously (c.f p.64).

5- Final considerations

5.1- Recommendations for local administration and public transport providers

With the objective of making final conclusions and possible recommendations to the public transportation stakeholders which are local governments, public transport providers and the community, in general, now it is the time to recall the objectives of this dissertation which are present in its beginning (pp.7 and 8). These objectives as well as, the key-questions were explored and explained thanks to the online survey which was applied to public transport users and car users which are current users of public transport users and potential public transport users, since most of them disagreed towards the statement 'I would never use public transportation' (p.54), could give an opportunity to public transport to become the primary form of transport for their commute (home-work/school) and other trips.

Regarding the results obtained in the previous points of the dissertation, it is time to suggest towards public transport providers, the local administration, other stakeholders, and recommendations to the community.

According to the results of the public transport users, security conditions must be improved regarding the presence of staff in the public transport stations/stops, improving the surveillance in all the stations in order to improve to police response in case of a robbery, assault, etc specially in those located in problematic areas of the city and/or suburbs, increase the campaigns concerning safety in the public transports, particularly in what concerns to women's feeling of safety to avoid situations of robbery and harassment.

Regarding the comfort conditions the public transport providers should increase the offer of seated places, the cleanliness of the public transport modes and the stations and provide accessibilities for those which carry luggage and shopping bags.

There are also other measures identified by public transport users to order to increase the perception of safety, such as the implementation of contact posts in order to alert the public transport provider and the police and wi-fi connection in both stations and inside the mode (metro, train, bus, ferry-boat) in order to contact family/friends in case of emergency and flexible schedules in the public transport modes in order to cover their needs.

In order to attract car users towards public transportation, public transport providers should improve the connections towards their destination and to other public transport modes, improve their easiness to travel while in the company of their children, having lower fares for

multiple destinations, provide conditions to people that travel carrying luggage, shopping bags and other materials and having detailed real time information in order to plan better their trips.

These measures would have the objective of women not being affected by several constrains, mainly technical problems that could appear along the way which could be prejudicial to their working and personal life, since private transport users would consider the public transport as viable alternative to their cars since public transports modes like the subway, train and ferry boat which are not influenced by the traffic conditions and mostly women consider that they don't have other viable mobility alternatives next to them.

5.2- Conclusions and Recommendations for future studies

In sum, in order to meet all the aims of this dissertation (p.9) it was used a vast literature review regarding the factors that contribute to increase the satisfaction of public transportation users, as well as, their loyalty towards the public transport and to attract new public transport users from the car users that could use the several modes of public transport in order to go to their workplaces, school/college and other less important trips.

The choice of the methodology was also quite effective since it will have an important role to take a descriptive view of the perceived satisfaction of public transportation users regarding reliability, security, comfort/services and overall satisfaction with the public transport and their opinion to improve the security conditions of the public transport. Regarding the private transport users, it was essential to trace if would consider using public transport modes, considering several improvements. The well-being was also important, since it is one satisfaction factor that was less approached in other studies. On the other side, the inferential analysis used in the methodology, was essential to check if there were (or not) significant differences between men versus women; public transport users versus private transport and other important associations like those present in the ANOVA analysis and crosstabulations.

After doing the descriptive statistics and the inferential analysis in order to conclude this assignment, it was verified that despite all the measures taken by public transport providers, especially when doing the mean differences (T-Test and Levene's test) there were still significant gender inequalities between men and women regarding their mobility, since women still prefer the private transport over the public transport mobility specially for matters of their security, since they alert towards the lack of surveillance (personal and material) of the stations and inside the transport being more susceptible of being assaulted, robbed, groped, etc by assailants, having

several cases of negative social experiences in the public transport that would make them to think twice about using public transport.

According to crosstabulations results, security is also important for the overall satisfaction transport users and for their loyalty towards public transport users increasing it or decreasing it in the case of negative experiences in the public transport users.

Regarding other public transport aspects like reliability, comfort and perceived satisfaction, despite of having worse results then men, they consider that they can rely on the transport and they feel comfortable, despite crowding, which is one of the biggest complains of both men and women especially in rush-hours and considering that improving the accessibility conditions when carrying materials and when they travel with children could be better. Reliability is also important for the loyalty and satisfaction of public transport users regarding their most used public transport. Finally, comfort and the quality of the existing services are also important for increasing/decreasing the satisfaction of public transport users regarding their overall satisfaction and their travel well-being, while they travel in their most used public transport mode.

Regarding the current services, women who use public transport modes were more sensitive towards the current services and they mostly consider that they should improve their current services in order to keep them loyal to their most used transport mode and in what concerns to women which use the private transport, they are the population which would be consider the public transport as viable alternative to car and they consider should have more and better connections to public transport in order to use it more frequently.

In what concerns to other studies, the study despite its extensive literature being it also present in the survey where the data was obtained, it could be a reference for future studies regarding gendered differences in the mobility since it provides wide range of perspectives – one from the public transport users and the other from the private transport users which mobility perceptions are different but they are complementary between each other, since private users could use public transport for their mobility instead of being susceptible to traffic jams and extra expenses regarding the fuel and maintenance of the car, among others, as well as, the perspectives of men and women regarding these two forms of mobility and their components (reliability, security, services, comfort , measures to increase the safety and overall perceived satisfaction) in the public transport and in private transport(perceived security, measures to increase safety , overall perceived satisfaction and intentions to use public transport).

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Annexes

Annex A- Online Survey

The online survey present in the Google Forms is available in two languages (Portuguese and English), being composed of 16 sections. The first section contains the instructions of the online survey, while the remaining 14 contain closed questions. Sections II and XV regard the sociodemographic features of the respondents. Section III is concerned about the household roles. Section IV and V regard the mobility habits of the respondents, splitting the public transport users (Sections VI to IX) and the private transport users(X to XII). The remaining sections are concerned about the travel well-being, loyalty, and personal welfare.

The online survey is available in these links:

https://docs.google.com/forms/d/e/1FAIpQLSd3Xjtr8rVFlVEgyedzoNKzosDPHf2XqI6grkIxqsQ0ZGHqkQ/viewform?usp=sf_link (Portuguese)

https://docs.google.com/forms/d/e/1FAIpQLSdTlXEVGtYucq3BTvA0CR73Rji7fZ3_Atl_50JFvzVrsKciFg/viewform?usp=sf_link (English)

Annex B- Case study

3.1.1- Metropolitano de Lisboa

Regarding the Metropolitano de Lisboa, it has four major lines: The Green Line that links Telheiras to Cais do Sodré which has connection to the train that connects Lisbon to Cascais and Oeiras areas to the west, having also a bus terminal in Campo Grande station that links Lisbon to Mafra and Torres Vedras area. The Yellow line that links Rato (in the centre of the city) to the northern suburbs of Odivelas;

The Blue line that links Reboleira station situated in Amadora suburbs to the rail station of Santa Apolónia that links Lisbon to the North of the country and connection to Sintra area (in Restauradores, situated in Rossio station and in Jardim Zoológico also known as Sete Rios) and the red line which links São Sebastião in the centre of the city with the International Airport in the station of Aeroporto . The network subway is graphically represented in this image:

Figure nº 3- Diagram of the Subway network. Adapted from: https://www.metrolisboa.pt/viajar/mapas-e-diagramas/

The subway operation timetables goes from 6 am to 1 am, justifying therefore the existence of a pink taxi which consists in an excellent alternative for women that go out with friends and, women who work in night shifts who need to return home safe and sound, without being subject of being harassed and/or assaulted by assailants. Pink taxis also feature discounted fares.

Another measure that could be useful for subway is the application of Wi-Fi in moving carriages, since it is already possible to use it in the stations and data mobile is also a solution, in order to avoid the emotional isolation of female users due to their tendency of wanting emotional support from their loved ones.

To overcome this, the Lisbon's underground incentive people by using audio communication in the stations and publicity on the carriages to communicate immediately to the staff for unusual situations in order to assure the reliability of the service and enable an effective and swift response to urgent and unexpected situations. In the topic of the application of new technologies were implemented stops with countdown, consisting in a system which indicates "the waiting time for desired transport" (Monteiro, et al,2016), existing in both Carris and in the subway(Lisbon). There is also the app ´Transitappmoveit´, which is an "traffic application for mobile phones" (Monteiro, et al, 2016).

Using this application , people can consult in-time information regarding several public transportation modes, notoriously the Lisbon Underground, Carris and CP (Comboios de Portugal), having also a feature denominated as ´Community Programme´, allowing people who

use it to send reports concerning information regarding "*congestion data, cleaning and changes in services*" (Monteiro et al 2016), presenting the data in constant actualization.

Regarding the frequency of modes, the range goes from 5 minutes between each train being more frequent in the peak hours (07h30-09h30 and 16h30-19h) to almost twelve minutes (12min between each mode) [1]. In which concerns to the types of trips, there are two kinds: the occasional trips and the frequent trips. The occasional trips combine the simple ticket (Carris/Metro) and the daily ticket, which is valid for 24 hours, which are used by rechargeable cards.

The frequent trips instead is provided by the Navegante pass card which is rechargeable and their main fares are the Navegante Metropolitano, being valid in other several public transport operators like CP, Fertagus, Carris for example inside the Metropolitan Area of Lisbon, the Navegante Municipal pass which is valid only in the municipalities of Lisbon, Amadora and Odivelas. The elderly (more than 65 years old) travel for less money (20€), while the children travel for free using the pass Navegante (+12) in all the Metropolitan area of Lisbon. [2].

Regarding discounted fares, one good example is the denominated Passe Social +, which is destined to family households that demonstrate less income. Its main advantage is to benefit from a less expensive cost regarding the acquisition of the monthly passes (Navegante Metropolitano and Navegante Municipal) [3]. Other discounted passes are the scholar passes 4_18 and sub23, which refer to children youngsters, as well as student who reunite specific conditions.

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1 https://www.metrolisboa.pt/viajar/horarios-e-frequencias/

2 https://www.metrolisboa.pt/comprar/

3 https://www.metrolisboa.pt/comprar/

[4], such as youngsters not available for the scholar transportation and students who frequent superior studies until 23 years old and students of the degrees of medicine and architecture until they have 24 years old. [5]

Regarding accessibilities, the Subway has access for people of reduced mobility to the subway platforms, as well as to the train(s) through elevator and ramps in these stations: Blue line: Reboleira, Amadora-Este, Alfornelos, Pontinha, Carnide, Colégio Militar/Luz, São Sebastião (also red line), Marquês de Pombal (also yellow line), Restauradores, Baixa-Chiado (also green line), Terreiro do Paço and Santa Apolónia; Green Line: Telheiras, Alvalade, Roma, Alameda, Rossio, Baixa-Chiado (blue line also) and Cais do Sodré; Yellow Line: Odivelas, Senhor Roubado, Ameixoeira, Lumiar, Quinta das Conchas, Saldanha (also red line), Marquês de Pombal (also blue line) and Rato; Red Line: São Sebastião (also blue line), Saldanha (also yellow line), Alameda (also green line), Olaias, Belavista, Chelas, Olivais, Cabo Ruivo, Oriente, Moscavide and Aeroporto, being graphically represented by the figure nº 4.

Regarding the accessibilities, there is also the presence of a special channel inside the carriages [6]which is suitable for people of reduced mobility, men and women with baby strollers and large volumes like travel bags, shopping bags, for example, people carrying children who have less than 4 years old.

3.1.2- Carris

Primarily, the mission of the public transportation operator Carris is to provide the passenger urban public transportation service by surface [7]in Lisbon and in its metropolitan area. Regarding its network diagram, it operates in five areas: North (Alvalade, Fetais, Galinheiras, Lumiar and Odivelas), Northwest (Alfragide, Benfica, Carnide, Damaia and Pontinha), West (Ajuda, Algés, Belém, Restelo and Linda-a velha), East (Encarnação, Marvila, Olivais, Portela

4 https://www.metrolisboa.pt/comprar/

5 https://www.carris.pt/compre/descontos/

6

7 https://www.carris.pt/a-carris/empresa/quem-somos/

and Parque das Nações) and Central Lisbon (Amoreiras, Bairro Alto, Campo de Ourique, Cais do Sodré, Castelo and Marquês de Pombal), being graphically represented in the figure 4.

Regarding the measures regarding an inclusive mobility, it could be verified that 74,5% of Carris fleet in their regular public service is equipped with conditions of full accessibility for passengers, which have a reduced mobility, having room for wheelchairs, backrests and access ramps[8]. Carris has also provides a special service of reduced mobility which works through previous scheduling in all the areas of Lisbon council that are part of Carris Network[9]. It is suitable for clients with more than 60% of declared motor incapacity.

Concerning its corporate social responsibility policies, mainly the social responsibility, Carris wants to eradicate any kind of discrimination [10], specifically the gender inequalities between men and women. In the case of Metropolitano de Lisboa, assumed its committing towards the sustainable development and with the 5th objective of sustainable development which is the gender equality by including several measures to reduce inequality men and women, being that the most prominent of them is the creation of the Baby Space in the station of Alameda II (red line), where the fathers and mothers can take care of their children which can do several activities like reading, painting, study, among many others[11], in order to adapt public transportation areas to the needs of families with children, being an initiative of the program '3 em Linha- Programa para a Conciliação da Vida Pessoal', implemented by the Portuguese Government in order to promote a suitable balance between social, familiar and professional life as a postulate to an unequivocal equality between men and women.[12]

Regarding other forms of mobility, another alternative is the rent-a-bike platform GIRA and friendly measures towards bicycles, with several bike lines across the city, being the newest bike line situated in Avenida Almirante Reis (linking Martim Moniz square with Praça do Chile,

8 https://www.carris.pt/viaje/mobilidade-reduzida/

9 https://www.carris.pt/viaje/mobilidade-reduzida/

10 https://www.carris.pt/a-carris/sustentabilidade/

11 https://www.metrolisboa.pt/2019/09/13/novo-espaco-bebe-na-estacao-alameda-ii/

12 https://www.metrolisboa.pt/2019/09/13/novo-espaco-bebe-na-estacao-alameda-ii/

located in Arroios)[13], being predicted to link the whole Avenida Almirante Reis in the north (Praça Francisco Sá Carneiro) in the end of the summer. [14]

Figure nº4- Colours of the city zones. Adapted from https://www.carris.pt/viaje/mapas/

13 https://www.lisboa.pt/atualidade/noticias/detalhe/nova-ciclovia-na-avenida-almirante-reis

14 https://www.lisboa.pt/atualidade/noticias/detalhe/nova-ciclovia-na-avenida-almirante-reis

Annex C- Public transport analysis

Reliability, Functionality and Accessibilities

Variable	Disagree	Slightly Disagree	Neither agree, nor disagree	Slightly Agree	Agree	Total
The time I was waiting for the next vehicle is acceptable	22,05	22,05	8,66	36,22	11,02	100
I was arriving fast from my departure point to my destination.	18,11	22,05	18,11	35,43	6,3	100
The frequency of the schedule was acceptable.	25,2	21,26	9,45	32,28	11,81	100
There was a lot of variability in what concerns the waiting time	18,9	20,47	14,17	26,77	19,69	100
The mode was arriving when expected.	18,11	27,56	9,45	33,07	11,81	100
I never had delays due to technical problems of this mode.	47,24	26,77	11,02	11,02	3,94	100
When technical problems occurred, the information was immediately communicated to the passengers.	29,92	28,35	12,6	17,32	11,81	100
I did not have to make many transfers using this mode.	14,96	18,11	9,45	25,98	31,5	100
The waiting time when I was changing transport mode or line was short.	11,81	25,98	20,47	30,71	11,02	100
Whenever I wanted to travel, there were connections of this mode close by.	8,66	19,69	17,32	36,22	18,11	100

With this mode, I always had available connections to my destination.	11,02	18,9	10,24	39,37	20,47	100
With this mode, I always had available connections to other public modes	8,66	11,02	9,45	41,73	29,13	100
With this mode, it was more advantageous to travel to points of the city that are closed to circulation and parking (mainly historic centres)	12,6	10,24	17,32	31,5	28,35	100
Moving and orienting myself within the station/stops of this mode was easy.	7,09	7,09	11,81	33,07	40,94	100
It was easy to get on and off this mode	4,72	11,02	11,81	37,01	35,43	100
It was easy to get on and off this mode with baby trolleys, shopping bags, luggage, or wheelchairs.	29,92	20,47	23,62	20,47	5,51	100

Table 5- Reliability**,** Functionality and Accessibilities

Security

Variable	Disagree	Slightly Disagree	Neither agree, nor disagree	Slightly Agree	Agree	Total
I was feeling safe using this mode during the day	5,51	9,45	4,72	28,35	51,97	100
I was feeling safe using this mode at night	13,39	16,54	18,11	28,35	23,62	100
I was feeling safe while waiting to the station/stop of the mode I use the most	7,87	12,6	14,17	34,65	30,71	100

I was feeling safe walking to the station/stop of the mode I use the most	4,72	16,54	12,6	35,43	30,71	100
My family/friends were not worried about me using the mode at night	15,75	22,83	13,39	24,41	23,62	100
My family/friends thought this mode was safe	11,02	13,39	19,69	28,35	27,56	100
The stations/stops were well illuminated.	8,66	23,62	7,87	37,8	22,05	100
There was always someone patrolling the stations especially at night.	51,97	24,41	10,24	10,24	3,15	100
Campaigns about awareness towards security were satisfactory	32,28	26,77	22,05	11,81	7,09	100
The surveillance system in the stations/stops of this mode was satisfactory.	37,01	22,83	18,11	16,54	5,51	100
The surveillance system made me feel safe when I use this mode, even if I am in problematic area of the city and/or in the suburbs.	35,43	22,83	19,69	15,75	6,3	100
The environment around the stations/stops of this mode makes me feel safe.	18,11	30,71	18,11	23,62	9,45	100
The response in case of an emergence/attack by the police and the transport operator was quick and coordinated.	19,69	19,69	46,46	9,45	4,72	100
Using this mode did not prevent me from travelling at night by this mode to see my friends and family.	12,6	18,9	17,32	27,56	23,62	100
I had been subject of an attempted assault and/or robbery while waiting for	72,44	8,66	9,45	3,15	6,3	100

the mode I use the most.						
I had been subject of an attempted assault and/or robbery inside the mode I use the most.	71,65	7,87	10,24	3,94	6,3	100
I had felt harassed inside the mode I use the most.	55,12	11,81	11,02	14,17	7,87	100
I had felt harassed while waiting in a station/stop for the mode I use the most.	55,12	12,6	12,6	14,17	5,51	100

Table 6- Security

Comfort

Variable	Disagree	Slightly Disagree	Neither agree, nor disagree	Slightly Agree	Agree	Total
There were enough seats	37,8	27,56	3,94	18,9	11,81	100
The seats were comfortable	19,69	20,47	18,9	29,13	11,81	100
There were too many people in the transport mode, especially in the rush-hour.	1,57	5,51	1,57	10,24	81,1	100
The transport mode, as well the station/stop, had a clean aspect.	17,32	28,35	18,11	25,2	11,02	100
I did not feel comfortable travelling with people that I do not know.	23,62	27,56	30,71	11,81	6,3	100
It was hard to use this transport when travelling with children	9,45	20,47	40,16	17,32	12,6	100

It was hard to use this transport when travelling with shopping bags or luggage.	5,51	14,17	21,26	37,01	22,05	100
I liked seeing people and having other people around me in this mode.	13,39	16,54	38,58	22,05	9,45	100
In this transport, I found people, noise and smells surrounding me unpleasant.	6,3	18,11	25,98	29,92	19,69	100

Table 7- Comfort

Services

Variable	Disagree	Slightly Disagree	Neither agree, nor disagree	Slightly Agree	Agree	Total
The staff was always available for helping	16,54	26,77	21,26	29,92	5,51	100
Onboard, I was informed about delays	40,94	25,98	11,81	14,96	6,3	100
It was easy to use applications for this transport mode.	20,47	22,83	23,62	22,83	10,24	100
The mobile applications were accurate.	25,2	17,32	27,56	20,47	9,45	100
I was considering the monthly pass affordable considering the trips that I made, and I wanted.	7,09	7,09	14,17	28,35	43,31	100
The price of the tickets was reasonable.	26,77	20,47	11,81	29,13	11,81	100
It was easy to buy tickets.	7,09	21,26	14,17	22,05	35,43	100
I was spending less on the monthly pass that	7,09	5,51	14,17	19,69	53,54	100

allowed me to travel in the metropolitan area compared to expenses related to a vehicle (mainly fuel and maintenance)						

Table 8- Services

Perceived Satisfaction

Variable	Disagree	Slightly Disagree	Neither agree, nor disagree	Slightly Agree	Agree	Total
Overall, I was satisfied with this transport mode.	8,66	14,17	16,54	42,52	18,11	100
I did not want to change anything about this mode.	44,88	22,83	14,17	11,02	7,09	100
The services provided were within my expectations	16,54	26,77	22,05	28,35	6,3	100
This was the best mode for my mobility	7,09	7,09	16,54	36,22	33,07	100
I am happy using this mode.	12,6	15,75	28,35	32,28	11,02	100
Overall, the positive aspects of this mode outweighed the negative ones.	14,17	11,81	16,54	37,8	19,69	100
The mode I	7,09	13,39	8,66	47,24	23,62	100

used the most was covering my mobility needs.						

Table 9- Perceived Satisfaction

Measures to increase safety in the public transport

Variable	Disagree	Slightly Disagree	Neither agree, nor disagree	Slightly Agree	Agree	Total
There should be an application in the smartphone to have a more personalized contact with the transport provider/police to alert to potentially dangerous situations.	2,36	3,15	11,81	28,35	54,33	100
There should be contact posts in the stations to contact the public transport provider and the police towards dangerous situations in order to increase the existent feeling of being safe.	1,57	1,57	3,94	28,35	64,57	100
The staff should guarantee passenger's security onboard.	0,79	2,36	7,09	27,56	62,2	100
There should Wi-Fi connection at the station/stop at the mode I use the most so that I contact people I know in case of emergency.	2,36	3,94	8,66	29,13	55,91	100
At night, the mode should be able to have flexible schedules to suit passenger's needs	0,79	3,94	7,87	25,98	61,42	100
At night, the mode should be able to let passenger at any point of	11,02	7,87	20,47	20,47	40,16	100

the route						
I am willing to pay more so that the operator installs contact posts and Wi-Fi in the mode I use the most.	36,22	15,75	23,62	14,17	10,24	100
I am willing to pay more to have access to car-sharing services combined with the public transport mode I use the most	24,41	21,26	19,69	17,32	17,32	100
I feel safer using a carpool system or platforms like Uber, Taxify than using this mode at night.	14,96	14,17	14,96	19,69	36,22	100
I feel safer travelling by car at night.	6,3	6,3	8,66	22,05	56,69	100
I feel safer using a carpool or platforms like Uber, Taxify, Cabify than using this mode at any time of the day.	29,13	22,05	20,47	14,17	14,17	100
I feel safer travelling by car at any time of the day	18,11	10,24	13,39	27,56	30,71	100

Table 10- Measures to increase safety in the public transport

Annex D- Private transport

Perceived safety in private transport

Variable	Disagree	Slightly Disagree	Neither agree, nor disagree	Slightly Agree	Agree	Total
I was feeling safe inside my own car during the day	0	0	3,85	11,54	84,62	100
I was feeling		3,85	3,85	20,19	72,12	100

safe inside my own car even at night						
I preferred travelling by car at night compared to public transport			6,73	7,69	85,58	100
Using the car did not prevent me from travelling at night by this mode to see my friends and family.	1,92	0,96	3,85	11,54	81,73	100
I was feeling safe looking for a parking spot in the area I live in	1,92	2,88	0,96	17,31	76,92	100
The area where I was parking my car was illuminated.	2,88	1,92	7,69	33,65	53,85	100
There was someone patrolling the area I was parking my car especially at night	57,69	14,42	16,35	6,73	4,81	100
The environment where I was parking my car made me feel safe	3,85	2,88	22,12	29,81	41,35	100
My family/friends think this	0,96	3,85	12,5	18,27	64,42	100

mode is safe						
My family/friends were not worried about me using this mode at night	3,85	4,81	15,38	19,23	56,73	100
I had felt harassed while walking from the point I have parked my car	76,92	9,62	6,73	3,85	2,88	100
I had been subject of an attempted assault and/or robbery while walking to/from my car	89,42	5,770	2,880		1,92	100
I had been subject of an attempted assault and/or robbery inside my car.	92,31	2,88	2,88	1,92		100
I had been subject of an attempted assault/robbery while waiting for a ride of someone close to me.	94,23	3,85	1,92			100

Table 11- Perceived safety in private transport

Measures to increase safety in private transport

Variable	Disagree	Slightly Disagree	Neither agree, nor disagree	Slightly Agree	Agree	Total
I would feel safe using parking lots only for women when I am alone	50,96	5,77	27,88	7,69	7,69	100
I would feel safe using parking lots only for women when I am with other adults.	52,88	4,81	32,69	0,96	8,65	100
I would feel safer using taxis and car-pooling (Uber, etc) only for women and driven by women compared to using my car at night	51,92	8,65	26,92	6,73	5,77	100
I would feel safe if there was better illumination around my usual parking stop close to my house	5,77	4,81	9,62	13,46	66,35	100
I would feel safe if there was better visibility of the environment around parking	3,85	4,81	5,77	19,23	66,35	100

areas.						

Table 12- Measures to increase safety in private transport

Perceived Satisfaction with car

Variable	Disagree	Slightly Disagree	Neither agree, nor disagree	Slightly Agree	Agree	Total
Overall, I was satisfied with the car as a transport mode	0	2,88	1,92	20,19	75	100
I did not want to change a thing about this mode	4,81	14,42	8,65	24,04	48,08	100
The conditions of moving by car were within my expectations.	1,92	2,88	8,65	26,92	59,62	100
This was the best mode for my mobility.	0,96	3,85	6,73	20,19	68,27	100
I was happy using the car	0	1,92	4,81	21,15	72,12	100
The car as a transport mode was covering my mobility needs.	0,96		3,85	20,19	75	100
Overall, the positive aspects of this mode outweighed the negative		0,96	4,81	22,12	72,12	100

ones						

Table 13- Satisfaction with car

Measures to increase the use of public transport

Variable	Disagree	Slightly Disagree	Neither agree	Slightly Agree	Agree	Total
I would use public transportation if I could travel easier with my children in it.	20,19	4,81	37,5	11,54	25,96	100
I would use more public transport if I could travel easier with shopping bags	16,35	5,77	23,08	23,08	31,73	100
I would use more public transport if I could have lower fares for multiple trips during the day	12,5	8,65	17,31	18,27	43,27	100
I would use more public transport if I could have better connections to my destination	4,81	4,81	6,73	20,19	63,46	100
I would use more public transport if I could have better access to the metro	6,73	6,73	18,27	17,31	50,96	100

or the train						
I would use more public transport if I had more real time information and could better plan my trips.	10,58	2,88	13,46	24,04	49,04	100
I would never use public transport	64,42	15,38	9,62	7,69	2,88	100

Table 14- Measures to increase the use of public transport

Annex E- Well-being

Travel well-being

Variable	Disagree	Slightly Disagree	Neither agree, nor disagree	Slightly Agree	Agree	Total
Travelling by this mode was enjoyable	5,28	7,32	13,82	20,73	52,85	100
Even in rush-hours, I was pleased with this mode	20,33	25,61	10,98	19,11	23,98	100
Travelling by this mode was giving me valuable personal time	15,04	13,01	13,01	22,76	36,18	100
Due to long time, I was spending in this mode, I didn't have time for the people living in my household,	29,27	20,33	21,95	19,51	8,94	100

shopping and other activities.						
This mode was the best option I had available.	5,28	4,88	10,16	25,2	54,47	100
Travelling by this mode was not affecting my feelings	8,94	10,57	23,58	20,73	36,18	100
I would never leave this mode for another transport mode.	25,61	13,41	22,76	22,76	15,45	100

Table 15- Travel well-being

Loyalty towards most used public transport

Variable	**Disagree**	**Slightly Disagree**	**Neither agree, nor disagree**	**Slightly Agree**	**Agree**	**Total**
Using this mode was increasing my quality of life	7,72	11,38	19,51	23,98	37,4	100
I could rely on this mode for my mobility	4,88	7,72	11,79	31,71	43,9	100
I would recommend this mode to others	6,91	7,32	11,79	33,74	40,24	100
No other mode could satisfy my mobility needs that well as this	18,7	15,85	19,51	20,73	25,2	100

one.						
This mode was the only available means of transport I had.	25,2	19,92	6,5	22,36	26,02	100
I continue using this mode today.	14,63	4,47	10,57	20,73	49,59	100

Table 16- Loyalty towards most used transport

Personal welfare

Variable	Disagree	Slightly Disagree	Neither agree, nor disagree	Slightly Agree	Agree	Total
I am satisfied with my job condition.	6,1	13,82	10,57	32,93	36,59	100
I am satisfied with my health condition.	3,25	10,98	6,5	29,67	49,59	100
I am satisfied with my life condition.	4,07	10,98	9,35	36,99	38,62	100
I am satisfied with the location of my house.	2,03	7,32	6,91	31,71	52,03	100
The conditions of my life are excellent.	3,25	12,2	19,92	44,72	19,92	100
I am extremely satisfied with my life.	5,28	9,35	16,67	44,72	23,98	100
In most ways my life is	8,13	15,04	19,92	35,37	21,54	100

close to my ideal.						

Table 17- Personal welfare

Sociodemographic characterization

Sociodemographic and socioeconomics			
Variables	Categories	% of the sample	
Gender	Male	40,3	
	Female	58,5	
	Other	1,2	
Household composition	One adult without children	28,6	
	One adult with children	7,3	
	More than one adult without children	39,1	
	More than one adult with children	25	
Variables	Categories	% of the sample	
Cars available in the household	0	12,9	
	1	33,5	
	2	37,1	
	More than 2 cars	16,5	
Location	Municipality of Lisbon	38,2	

	Urban area in the north bay of the Great Lisbon Metropolitan Area	19,9	
	Rural area in the north bay of the Great Lisbon Metropolitan Area	2,4	
	Urban area in the south bay of the Great Lisbon Metropolitan Area	12,2	
	Rural area in the south bay of the Great Lisbon Metropolitan Area	27,2	
Variable	Categories	% of the sample	
Age-group	18-24	12,6	
	25-34	39,8	
	35-44	21,5	
	45-54	13,8	
	55-64	9,8	
	+65 years old	2,4	
Do you rely on other people in what concerns your mobility?	Yes	17,1	

	No	82,9	
What is your current employment state?	Fully employed	72	
	Part-time employed	3,3	
	Student	14,2	
	Retired	2,4	
	Unemployed	3,7	
	Other	4,5	
Please indicate an approximation of your monthly net income.	Less than 500 euros	16,3	
	500-1000 euros	29,7	
	1000-1500 euros	33,7	
	1500-2000 euros	9,8	
	2000-2500 euros	6,1	
	+ 2500 euros	4,5	

Table 18- Sociodemographic characterization

Annex F- Mean differences regarding men and women

I- Public transport

Reliability, Functionality and Acessibilities

	Gender	N	Média	Erro Desvio	Erro padrão da média
The time I was waiting for the next vehicle is acceptable.	Male	48	3,19	1,266	,183
	Female	79	2,76	1,434	,161
I was arriving fast from my departure point to my destination.	Male	48	2,96	1,051	,152
	Female	79	2,86	1,356	,153
The frequency of the schedule was acceptable.	Male	48	3,10	1,325	,191
	Female	79	2,68	1,455	,164
There was a lot of variability in what concerns the waiting time.	Male	48	3,19	1,214	,175
	Female	79	3,01	1,540	,173
The mode was arriving when expected.	Male	48	3,21	1,129	,163
	Female	79	2,76	1,443	,162
I never had delays due to technical problems of this mode.	Male	48	2,08	1,108	,160
	Female	79	1,91	1,221	,137
When technical problems occurred, the information was immediately communicated to the passengers.	Male	48	2,73	1,233	,178
	Female	79	2,41	1,463	,165
I didn´t have to make many transfers using this mode.	Male	48	3,52	1,368	,197
	Female	79	3,34	1,527	,172
The waiting time when I was changing transport mode or line was short.	Male	48	3,10	1,077	,155
	Female	79	2,99	1,306	,147
Whenever I wanted to travel, there were connections of this mode close by.	Male	48	3,35	1,101	,159
	Female	79	3,35	1,311	,148
With this mode, I always had available connections to my destination.	Male	48	3,54	1,148	,166
	Female	79	3,30	1,390	,156
With this mode, I always had available connections to other public transport modes.	Male	48	3,83	,907	,131
	Female	79	3,65	1,405	,158

With this mode, it was more advantageous to travel to points of the city that are closed to circulation and parking (namely historic centres).	Male	48	3,65	1,158	,167
	Female	79	3,46	1,439	,162
Moving and orienting myself within the stations/stops of this mode was easy.	Male	48	4,04	1,091	,157
	Female	79	3,87	1,275	,143
It was easy to get on and off this mode.	Male	48	4,06	,954	,138
	Female	79	3,76	1,253	,141
It was easy to get on and off this mode with baby trolleys, shopping bags, luggage, or wheelchairs.	Male	48	2,65	1,194	,172
	Female	79	2,43	1,308	,147

Table 25- Gender differences in Reliability, Functionality and Accessibilities

Variable	Levene test	T-Test	Mann-Whitney test	Mean Rank Male	Mean Rank Female	Decision
The time I was waiting for the next vehicle is acceptable	0,079	0,091	0,095	70,75	59,90	Retain H0
I was arriving fast from my departure point to my destination	0,001	0,651	0,807	64,99	63,40	Retain H0
The frequency of the schedule was acceptable	0,084	0,105	0,113	70,43	60,09	Retain H0
There was a lot of variability in what concerns the waiting time	0,004	0,479	0,597	66,17	62,68	Retain H0
The mode was arriving when expected	0,002	0,053	0,072	71,29	59,57	Retain H0
I never had delays due to technical problems of this mode	0,598	0,427	0,191	69,11	60,89	Retain H0

When technical problems occurred, the information was immediately communicated to the passengers.	0,145	0,202	0,105	70,59	59,99	Retain H0
I did not have to make many transfers using this mode.	0,129	0,507	0,671	65,75	62,95	Retain H0
The waiting time when I was changing transport mode or line was short.	0,100	0,603	0,616	66,06	62,76	Retain H0
Whenever I wanted to travel, there were connections of this mode close by,	0,043	0,999	0,807	63,01	64,60	Retain H0
With this mode, I always had available connections to my destination	0,028	0,299	0,448	67,05	62,15	Retain H0
With this mode I always had available connections to other transport modes	0,000	0,362	0,846	63,23	64,47	Retain H0
With this mode, it was more advantageous to travel to points of the city that are closed to circulation and parking (namely historic centres)	0,018	0,416	0,677	65,69	62,97	Retain H0
Moving and orienting myself within	0,171	0,448	0,626	65,93	62,83	Retain H0

the station/stops of this mode was easy.						
It was easy to get on and off this mode.	0,017	0,127	0,282	68,28	61,40	Retain H0
It was easy to get on and off this mode with baby trolleys, shopping bags, luggage, or wheelchairs.	0,245	0,354	0,303	68,19	61,46	Retain H0

Table 26- Differences between men and women regarding public transport reliability, functionality, and accessibilities

Security

Estatísticas de grupo

	Gender	N	Média	Erro Desvio	Erro padrão da média
I was feeling safe using this mode during the day.	Male	48	4,25	,957	,138
	Female	79	4,04	1,325	,149
I was feeling safe using this mode at night.	Male	48	3,71	1,184	,171
	Female	79	3,09	1,407	,158
I was feeling safe while waiting in the station/stop of the mode I use the most.	Male	48	3,94	,998	,144
	Female	79	3,52	1,367	,154
I was feeling safe walking to the station/stop of the mode I use the most.	Male	48	3,92	1,088	,157
	Female	79	3,58	1,257	,141

My family/friends were not worried about me using this mode at night.	Male	48	3,50	1,305	,188
	Female	79	2,97	1,467	,165
My family/friends thought this mode was safe.	Male	48	3,83	1,098	,158
	Female	79	3,27	1,402	,158
The stations/stops were well illuminated.	Male	48	3,73	1,125	,162
	Female	79	3,22	1,365	,154
There was always someone patrolling the stations especially at night.	Male	48	2,08	1,182	,171
	Female	79	1,76	1,112	,125
Campaigns about awareness towards security were satisfactory.	Male	48	2,73	1,180	,170
	Female	79	2,11	1,230	,138
The surveillance system in the stations/stops of this mode was satisfactory.	Male	48	2,79	1,271	,183
	Female	79	2,01	1,193	,134
The surveillance system made me feel safe when I use this mode, even if I am in a problematic area of the city and/or in the suburbs.	Male	48	2,79	1,304	,188
	Female	79	2,08	1,196	,135
The environment around the stations/stops of this mode makes me feel safe.	Male	48	3,15	1,271	,184

	Female	79	2,52	1,207	,136
The response in case of an emergence/attack by the police and the transport operator was quick and coordinated.	Male	48	3,00	,945	,136
	Female	79	2,35	1,050	,118
Using this mode did not prevent me from traveling at night by this mode to see my friends and family.	Male	48	3,65	1,211	,175
	Female	79	3,10	1,401	,158
I had been subject of an attempted assault and/or robbery while waiting for the mode I use the most.	Male	48	1,73	1,300	,188
	Female	79	1,56	1,095	,123
I had been subject of an attempted assault and/or robbery inside the mode I use the most.	Male	48	1,81	1,379	,199
	Female	79	1,56	1,071	,121
I had felt harassed inside the mode I use the most.	Male	48	1,65	1,158	,167
	Female	79	2,34	1,467	,165
I had felt harassed while waiting in a station/stop for the mode I use the most.	Male	48	1,73	1,233	,178
	Female	79	2,20	1,353	,152

Table 27 - Mean differences between men and women regarding the security aspects of the public transport modes

Variable	**Levene test**	**T-Test**	**Mann-Whitney test**	**Mean Rank**	**Mean Rank**	**Decision**

				Male	**Female**	
I was feeling safe using this mode during the day	0,017	0,299	0,924	64,36	63,78	Retain H0
I was feeling safe using this mode at night.	0,036	0,009	0,017	73,74	58,08	Reject H0
I was feeling safe while waiting in the station/stop of the mode I use the most.	0,000	0,049	0,169	69,54	60,63	Retain H0
I was feeling safe while walking in the station/stop of the mode I use the most.	0,031	0,116	0,172	69,49	60,66	Retain H0
My family /friends were not worried about me using this mode at night.	0,168	0,044	0,051	71,99	59,15	Retain H0
My family/friends thought this mode was safe	0,005	0,012	0,033	72,70	58,72	Reject H0
The stations/stops were well illuminated	0,001	0,023	0,054	71,74	59,30	Retain H0
There was someone patrolling the station especially at night.	0,589	0,123	0,076	70,82	59,85	Retain H0
Campaigns about awareness towards security were satisfactory.	0,028	0,006	0,003	76,00	56,71	Reject H0
The surveillance system in the stations/stops of	0,207	0,001	0,001	77,83	55,59	Reject H0

this mode was satisfactory.						
The surveillance system made me feel safe even when I use this mode, even if I am in a problematic area of the city and/or in the suburbs.	0,320	0,002	0,002	76,44	56,44	Reject H0
The environment around the stations/stops of this mode makes me feel safe.	0,764	0,006	0,008	74,89	57,39	Reject H0
The response in case of an emergence/attack by the police and the transport operator was quick and coordinated	0,008	0,001	0,000	77,86	55,58	Reject H0
Using this mode did not prevent me from travelling at night by this mode to see my friends and family.	0,161	0,027	0,034	72,69	58,72	Reject H0
I had been subject of an attempted assault and/or robbery while waiting for the mode I use the most.	0,116	0,425	0,615	65,66	62,99	Retain H0
I had been subject of an attempted assault and/or robbery inside the mode I use the most.	0,026	0,275	0,426	66,65	62,39	Retain H0
I had felt harassed inside	0,001	0,004	0,004	53,17	70,58	Reject H0

the mode I use the most.						
I had felt harassed while waiting in a station/stop for the mode I use the most.	0,128	0,050	0,027	55,60	69,10	Retain H0

Table - Mean differences (Levene, T-Test and Mann-Whitney) regarding security and Gender

Comfort

Estatísticas de grupo

	Gender	N	Média	Erro Desvio	Erro padrão da média
There were enough seats.	Male	48	2,58	1,366	,197
	Female	79	2,28	1,493	,168
The seats were comfortable.	Male	48	3,00	1,185	,171
	Female	79	2,89	1,414	,159
There were too many people in the transport mode, especially in in the rush-hour.	Male	48	4,54	,967	,140
	Female	79	4,70	,837	,094
The transport mode, as well the station/stop, had a clean aspect.	Male	48	2,96	1,254	,181
	Female	79	2,77	1,310	,147
I didn´t feel comfortable travelling with people that I do not know.	Male	48	2,42	,919	,133
	Female	79	2,54	1,289	,145
It was hard to use this transport mode when travelling with children.	Male	48	2,85	1,052	,152
	Female	79	3,14	1,163	,131

It was hard to use this transport mode when travelling with shopping bags or luggage.	Male	48	3,48	1,111	,160
	Female	79	3,61	1,170	,132
I liked seeing people and having other people around me in this mode.	Male	48	3,04	1,110	,160
	Female	79	2,94	1,170	,132
In this transport mode, I found people, noise and smells surrounding me unpleasant.	Male	48	3,29	,967	,140
	Female	79	3,44	1,288	,145

Table - Mean differences regarding men and women regarding the comfort conditions verified in the public transport

Variable	Levene	T-Test	Whitney	Mean Rank Male	Mean Rank Female	Decision
There were enough seats	0,689	0,242	0,144	69,85	60,44	Retain H0
The seats were comfortable	0,074	0,641	0,641	65,91	62,84	Retain H0
There were too many people in the transport mode, especially in the rush-hour.	0,158	0,344	0,190	60,25	66,28	Retain H0
The transport mode as well the station/stop had a clean aspect.	0,397	0,432	0,423	67,27	62,01	Retain H0
I did not feel comfortable travelling	0,001	0,517	0,636	62,08	65,16	Retain H0

with people that I do not know.						
It was hard to use this transport mode when travelling with children.	0,425	0,168	0,130	57,93	67,69	Retain H0
It was hard to use this mode when travelling with shopping bags or luggage.	0,574	0,542	0,466	61,06	65,78	Retain H0
I liked seeing people and having people around me in this mode	0,842	0,618	0,600	66,11	62,72	Retain H0
In this transport mode, I found people, noise and smells surrounding me unpleasant.	0,002	0,453	0,358	60,26	66,27	Retain H0

Table - Mean differences/Tests regarding comfort and gender

Services

Estatísticas de grupo

	Gender	N	Média	Erro Desvio	Erro padrão da média
The staff was always available for helping.	Male	48	2,77	1,225	,177
	Female	79	2,84	1,181	,133

Onboard, I was informed about delays.	Male	48	2,35	1,329	,192
	Female	79	2,10	1,267	,143
It was easy to use applications for this transport mode.	Male	48	2,83	1,374	,198
	Female	79	2,77	1,240	,139
The mobile applications were accurate.	Male	48	2,65	1,211	,175
	Female	79	2,76	1,361	,153
I was considering the monthly pass affordable considering the trips that I made and I wanted.	Male	48	3,85	1,238	,179
	Female	79	3,99	1,225	,138
The price of the tickets was reasonable.	Male	48	3,06	1,343	,194
	Female	79	2,62	1,444	,162
It was easy to buy tickets.	Male	48	3,52	1,337	,193
	Female	79	3,61	1,363	,153
I was spending less on the monthly pass that allowed me to travel in the metropolitan area compared to expenses related to a vehicle (mainly fuel and maintenance).	Male	48	4,06	1,080	,156
	Female	79	4,08	1,338	,150

Table - Mean differences between men and women regarding the existing services in the public transport

Variable	Levene test	T-Test	Mann-Whitney test	Mean Rank Men	Mean Rank Women	Decision
The staff was always available for	0,906	0,769	0,706	62,47	64,93	Retain H0

helping						
Onboard I was informed about delays	0,232	0,286	0,298	68,16	61,47	Retain H0
It was easy to use applications for this transport mode.	0,239	0,796	0,811	64,98	63,41	Retain H0
The mobile applications were accurate.	0,538	0,635	0,752	62,71	64,78	Retain H0
I was considering the monthly pass affordable considering the trips that I made and I wanted	0,991	0,555	0,444	60,97	65,84	Retain H0
The price of the tickets was reasonable.	0,303	0,088	0,080	71,14	59,66	Retain H0
It was easy to buy tickets	0,641	0,727	0,665	62,25	65,06	Retain H0
I was spending less on the monthly pass that allowed me to travel in the metropolitan area compared to expenses related to a vehicle (mainly fuel and	0,039	0,951	0,374	60,59	66,07	Retain H0

maintenance)						

Table - Mean differences between services and gender

Measures to increase security

	Gender	N	Média	Erro Desvio	Erro padrão da média
There should be an application in the smartphone to have a more personalized contact with the transport provider/police to alert to potentially dangerous situations.	Male	48	4,29	,849	,123
	Female	79	4,29	1,027	,116
There should be contact posts in the stations to contact the public transportation provider and the police towards dangerous situations in order to increase the existent feeling of being safe.	Male	48	4,33	,781	,113
	Female	79	4,65	,769	,086
The staff should guarantee passengers´ security onboard.	Male	48	4,33	,781	,113
	Female	79	4,57	,796	,090
There should exist Wi-Fi connection at the station/stop and the mode I use the most so that I contact people that I know in case of emergency.	Male	48	4,04	1,071	,155
	Female	79	4,49	,845	,095
At night, the mode should be have flexible schedules to suit passengers´ needs.	Male	48	4,06	1,040	,150

	Female	79	4,66	,638	,072
At night, the mode should be able to let passengers at any point of the route.	Male	48	3,58	1,381	,199
	Female	79	3,78	1,346	,151
I am willing to pay more so that the operator installs contact posts and Wi-Fi in the mode I use the most.	Male	48	2,35	1,313	,189
	Female	79	2,53	1,413	,159
I am willing to pay more in order to have access to car-sharing services combined with the public transport mode I use the most.	Male	48	2,79	1,458	,210
	Female	79	2,84	1,418	,160
I feel safer using a carpool system or platforms like Uber, Taxify Cabify than using this mode at night.	Male	48	3,48	1,304	,188
	Female	79	3,48	1,576	,177
I feel safer travelling by car at night.	Male	48	4,27	,939	,136
	Female	79	4,10	1,345	,151
I feel safer using a carpool system or platforms like Uber, Taxify Cabify than using this mode at any time of the day.	Male	48	2,83	1,374	,198
	Female	79	2,49	1,413	,159
I feel safer travelling by car at any time of the day.	Male	48	3,71	1,304	,188

	Female	79	3,25	1,548	,174

Table - Mean differences between men and women regarding the measures to increase safety in the public transport

Variable	**Levene test**	**T-Test**	**Mann-Whitney**	**Mean Rank Men**	**Mean Rank Women**	**Decision**
There should be an application in the smartphone to have a more personalized contact with the transport provider/police to alert to potential dangerous situations	0,160	0,998	0,537	61,67	65,42	Retain H0
There should be contact posts in the stations in order to contact the public transport provider and the police towards dangerous situations in order to increase the existent feeling of being safe	0,247	0,030	0,003	53,49	70,39	Reject H0
The staff should guarantee passengers security onboard.	0,745	0,105	0,022	55,77	69,00	Reject H0
There should exist Wi-Fi connection at the station/stop in the mode I use the most so that I contact people that I know in case of emergency.	0,413	0,009	0,005	53,38	70,46	Reject H0
At night, the mode should be have flexible schedules to suit passenger's needs.	0,004	0,000	0,000	50,35	72,29	Reject H0
At night, the mode should be able to let passengers by any point of the route.	0,502	0,420	0,403	60,65	66,04	Retain H0
I am willing to pay more so that the operator installs contact posts and Wi-Fi	0,476	0,482	0,542	61,53	65,50	Retain H0

in the mode I use the most						
I am willing to pay more in order to have access to car-sharing services combined with the public transport mode I use the most	0,422	0,868	0,845	63,20	64,49	Retain H0
I feel safer using a carpool system like Uber, Taxify Cabify than using this mode at night.	0,019	0,994	0,738	62,65	64,82	Retain H0
I feel safer travelling by car at night.	0,006	0,406	0,769	62,90	64,67	Retain H0
I feel safer using a carpool system or platforms like Uber, Cabify than using this mode at any time of the day.	0,750	0,187	0,158	69,77	60,49	Retain H0
I feel safer travelling by car at any time of the day.	0,029	0,079	0,123	70,27	60,19	Retain H0

Table - Mean differences between men and women regarding measures to improve the security in public transport

Estatísticas de grupo

	Gender	N	Média	Erro Desvio	Erro padrão da média
Overall, I was satisfied with this transport mode.	Male	48	3,48	1,111	,160
	Female	79	3,47	1,249	,141
I didn´t want to change anything about this mode.	Male	48	2,19	1,197	,173
	Female	79	2,09	1,351	,152
The services provided were within my expectations.	Male	48	3,04	1,129	,163
	Female	79	2,67	1,227	,138
This was the best mode for my mobility.	Male	48	3,75	,978	,141
	Female	79	3,85	1,292	,145
I was happy using this mode.	Male	48	3,27	,984	,142
	Female	79	3,05	1,300	,146

Variable	Levene test	T-Test	Mann-Whitney test	Mean Rank Men	Mean Rank Women	Decision

Overall, I satisfied with this transport mode	0,271	0,961	0,861	63,30	64,42	Retain H0
I did not want to change anything about this mode	0,371	0,677	0,398	67,34	61,97	Retain H0
The service provided were within my expectations	0,383	0,091	0,087	70,96	59,77	Retain H0
This was the best mode of my mobility	0,097	0,651	0,208	58,97	67,06	Retain H0
I was happy using this mode	0,039	0,282	0,519	66,61	62,41	Retain H0
Overall, the positive aspects of this mode outweighed the negative ones.	0,129	0,468	0,646	65,85	62,87	Retain H0
The mode I used the most was covering my mobility needs.	0,433	0,744	0,435	60,94	65,86	Retain H0

Tables 37 and 38- Mean differences between perceived overall satisfaction and Tests

II- Private transport

Estatísticas de grupo

	Gender	N	Média	Erro Desvio	Erro padrão da média
I was feeling safe inside my own car during the day.	Male	45	4,80	,505	,075
	Female	59	4,81	,473	,062
I was feeling safe inside my own car even at night.	Male	45	4,76	,570	,085
	Female	59	4,49	,838	,109

I preferred travelling by car at night compared to public transport.	Male	45	4,80	,505	,075
	Female	59	4,78	,589	,077
Using the car did not prevent me from travelling at night by this mode to see my friends and family.	Male	45	4,82	,490	,073
	Female	59	4,61	,910	,118
I was feeling safe looking for a parking spot at the area I live in.	Male	45	4,80	,457	,068
	Female	59	4,53	,989	,129
The area where I was parking my car was well-illuminated.	Male	45	4,36	,743	,111
	Female	59	4,32	1,041	,136
There was always someone patrolling the area I was parking my car especially at night.	Male	45	2,07	1,268	,189
	Female	59	1,71	1,130	,147
The environment where I was parking my car made me feel safe.	Male	45	3,96	,999	,149
	Female	59	4,07	1,096	,143
My family/friends think this mode is safe.	Male	45	4,44	,893	,133
	Female	59	4,39	,947	,123
My family/friends were not worried about me using this mode at night.	Male	45	4,36	1,048	,156
	Female	59	4,08	1,149	,150
I had felt harassed while walking to/from the point I have parked my car.	Male	45	1,24	,712	,106
	Female	59	1,63	1,128	,147
I had been subject of an attempted assault and/or robbery while walking to/from my car.	Male	45	1,27	,863	,129
	Female	59	1,14	,472	,061
I had been subject of an	Male	45	1,20	,694	,103

attempted assault and/or robbery inside my car.	Female	59	1,10	,402	,052
I had been subject of an attempted assault/robbery while waiting for a ride of someone close to me.	Male	45	1,04	,208	,031
	Female	59	1,10	,402	,052

Table 37- Mean differences between men and women regarding the perception of safety in the car

Variable	**Levene test**	**T-Test**	**Mann Whitney test**	**Mean Rank Men**	**Mean Rank Women**	**Decision**
I was feeling safe inside my own car during the day	0,760	0,888	0,950	52,37	52,60	Retain H0
I was feeling safe inside my own car even at night.	0,008	0,059	0,054	57,63	48,58	Retain H0
I preferred travelling by car at night compared to public transportation.	0,601	0,853	0,855	52,12	52,79	Retain H0
Using the car didn't prevent me from travelling at night by this mode to see my friends and family.	0,009	0,131	0,240	55,18	50,46	Retain H0
I was feeling safe looking for a parking spot at the area I live in	0,002	0,063	0,216	55,58	50,15	Retain H0
The area where I was parking my car was very illuminated	0,184	0,855	0,564	50,74	53,84	Retain H0
There was	0,541	0,136	0,086	57,70	48,53	Retain H0

someone patrolling the area I was parking my car especially at night						
The environment where I was parking my car made me feel safe	0,535	0,592	0,401	49,81	54,55	Retain H0
My family/friends think this mode is safe	0,499	0,766	0,859	53,01	52,11	Retain H0
My family/friends were not worried about me using this mode at night.	0,436	0,219	0,168	56,69	49,31	Retain H0
I had felt harassed while walking to/from the point I have parked my car	0,000	0,037	0,077	48,08	55,87	Retain H0
I had been subject of an attempted assault and/or robbery while walking to/from my car.	0,058	0,325	0,435	53,91	51,42	Retain h0
I had been subject of an attempted assault and/or robbery inside my car.	0,063	0,367	0,650	53,21	51,96	Retain H0
I had been subject of an attempted assault/robbery while waiting	0,076	0,387	0,592	51,77	53,06	Retain H0

for a ride of someone close to me						

Table 38- Percieves security of car users and gender differences

Estatísticas de grupo

	Gender	N	Média	Erro Desvio	Erro padrão da média
I would feel safer using parking lots only for women when I am alone.	Male	45	2,31	1,379	,206
	Female	59	2,03	1,299	,169
I would feel safer using parking lots only for women when I am with other adults.	Male	45	2,22	1,347	,201
	Female	59	1,97	1,259	,164
I would feel safer using taxis and car-pooling (Uber etc) only for women and driven by women compared to using my car at night.	Male	45	1,98	1,055	,157
	Female	59	2,12	1,403	,183
I would feel safer if there was better illumination around my usual parking spot close to my house.	Male	45	4,27	1,156	,172
	Female	59	4,32	1,210	,157
I would feel safer if there was better visibility of the environment around parking areas.	Male	45	4,31	1,083	,162
	Female	59	4,46	1,039	,135

Table 39- Mean differences between men and women regarding measures to increase safety in private transport (car)

Variable	**Levene Test**	**T-Test**	**Mann-Whitney Test**	**Mean Rank Men**	**Mean Rank Women**	**Decision**
I would feel safer using parking lots only for	0,693	0,296	0,302	55,71	50,05	Retain H0

women when I am alone						
I would feel safer using parking lots only for women when I am with other adults	0,634	0,321	0,311	55,60	50,14	Retain H0
I would feel safer using taxis and car-pooling (Uber etc) only for women compared to using my car at night.	0,014	0,560	0,858	51,94	52,92	Retain H0
I would feel safer if there was better illumination around my usual parking spot close to my house	0,837	0,814	0,560	50,84	53,76	Retain H0
I would feel safer if there was better visibility of the environment around parking areas.	0,446	0,486	0,410	50,17	54,28	Retain H0

Table 40- Mean differences in genders regarding measures to increase security in the car

Estatísticas de grupo

	Gender	N	Média	Erro Desvio	Erro padrão da média
Overall, I was satisfied with the car as a transport mode.	Male	45	4,60	,688	,102
	Female	59	4,73	,639	,083
I didn´t want to change	Male	45	3,91	1,240	,185

anything about this mode.	Female	59	4,00	1,287	,167
The conditions of moving by car were within my expectations.	Male	45	4,40	,809	,121
	Female	59	4,39	,983	,128
This was the best mode for my mobility.	Male	45	4,29	1,036	,154
	Female	59	4,68	,655	,085
I was happy using the car.	Male	45	4,51	,815	,122
	Female	59	4,73	,520	,068
The car as a transport mode was covering my mobility needs.	Male	45	4,58	,783	,117
	Female	59	4,76	,503	,065
Overall, the positive aspects of this mode outweighed the negative ones.	Male	45	4,56	,725	,108
	Female	59	4,73	,520	,068

Table 41- Mean differences between men and women regarding perceived satisfaction in private transport

Variable	**Levene test**	**T-Test**	**Mann-Whitney test**	**Mean Rank Men**	**Mean Rank Women**	**Decision**
Overall, I was satisfied with the car as a transport mode	0,175	0,327	0,208	49,28	54,96	Retain H0
I did not want to change anything about this mode	0,970	0,724	0,591	50,80	53,80	Retain H0
The conditions of moving by car were within my expectations	0,637	0,955	0,733	51,49	53,27	Retain H0
This was the best mode for my mobility	0,002	0,031	0,032	46,54	57,04	Reject H0
I was happy	0,003	0,122	0,211	49,18	55,03	Retain H0

using the car						
The car as a transport mode was covering my mobility needs	0,016	0,171	0,198	49,21	55,01	Retain H0
Overall, the positive aspects of this mode outweighed the negative ones.	0,012	0,178	0,236	49,36	54,90	Retain H0

Table 42- Means differences in genders concerning perceived satisfaction in the car

Estatísticas de grupo

	Gender	N	Média	Erro Desvio	Erro padrão da média
I would use more public transport if I could travel easier with my children in it.	Male	45	3,20	1,502	,224
	Female	59	3,17	1,354	,176
I would use more public transport if I could travel easier with shopping bags	Male	45	3,42	1,485	,221
	Female	59	3,53	1,369	,178
I would use more public transport if I could have lower fares for multiple trips during the day.	Male	45	3,69	1,459	,217
	Female	59	3,73	1,400	,182
I would use more public transport if I could have better connections to my destination.	Male	45	4,20	1,272	,190
	Female	59	4,42	,969	,126
I would use more public transport if I could have better access to the metro or train.	Male	45	3,98	1,270	,189
	Female	59	4,00	1,259	,164
I would use more public	Male	45	3,96	1,205	,180

transport if I had more real-time information and could better plan my trips.	Female	59	4,00	1,390	,181
I would never use public transport.	Male	45	1,84	1,065	,159
	Female	59	1,58	1,133	,147

Table nº43- Measures to increase the use of transport public in car users by gender

Variable	**Levene test**	**T-Test**	**Mann-Whitney test**	**Mean Rank Men**	**Mean Rank Women**	**Decision**
I would use more public transport if I could travel easier with my children in it.	0,195	0,914	0,840	53,16	52,00	Retain H0
I would use more public transport if I could travel easier with shopping bags.	0,442	0,714	0,839	51,83	53,01	Retain H0
I would use more public transport if I could have lower fares for multiple trips during the day.	0,765	0,888	0,918	52,17	52,75	Retain H0
I would use more public transport if I could have better connections to my destination.	0,066	0,311	0,606	51,00	53,64	Retain H0
I would use more public transport if I could have	0,770	0,929	0,879	52,02	52,86	Retain H0

better access to metro or train						
I would use more public transport if I had more real-time information and could better plan my trips.	0,123	0,865	0,403	49,87	54,51	Retain H0
I would never use public transport	0,978	0,223	0,042	58,39	48,01	Reject H0

Table 44- Mean differences between genders regarding the intentions to use public transport (car users)

Annex G- Well-being differences between public transport users and car users

I- Travel well-being

Estatísticas de grupo

	Private transport	N	Média	Erro Desvio	Erro padrão da média
Travelling by this mode was enjoyable.	,00	127	3,56	1,276	,113
	1,00	119	4,65	,787	,072
Even in rush-hours, I was pleased with this mode.	,00	127	2,35	1,293	,115
	1,00	119	3,71	1,366	,125
Travelling by this mode was giving me valuable personal time.	,00	127	3,02	1,491	,132
	1,00	119	4,06	1,230	,113
Due to the long time I was spending in this mode, I did not have time for the people living in my household, shopping and other activities.	,00	127	2,83	1,332	,118
	1,00	119	2,32	1,275	,117
This mode was the best option I had available.	,00	127	3,99	1,137	,101
	1,00	119	4,39	1,099	,101
Travelling by this mode was not affecting my feelings.	,00	127	3,33	1,334	,118
	1,00	119	3,98	1,193	,109

I would never leave this mode	,00	127	2,75	1,431	,127
for another transport mode.	1,00	119	3,04	1,386	,127

Table 19- Travel well-being between Public transport and private transport users

Variable	Levene test	T-Test	Mann-Whitney test	Mean Rank Public	Mean Rank Private	Decision
Travelling by this mode was enjoyable	0,000	0,000	0,000	92,22	156,88	Reject H0
Even in rush-hour, I was pleased with this mode	0,269	0,000	0,000	92,62	156,46	Reject H0
Travelling by this mode was giving me valuable personal time	0,000	0	0,000	99,28	149,35	Reject H0
Due to the long time I was spending in this mode, I did not have time for the people living in my household, shopping and other activities	0,000	0,002	0,002	136,44	109,68	Reject H0
This mode was the option I had available	0,810	0,002	0,000	108,52	139,49	Reject H0

Travelling by this mode was not affecting my feelings.	0,144	0,000	0,000	106,61	141,52	Reject H0
I would never leave this mode for another mode	0,928	0,103	0,102	116,49	130,98	Retain H0

Table 20 - Travel well-being and differences between public and private transport

II- Loyalty towards most used transport mode between public and private transport users

	Private transport	N	Média	Erro Desvio	Erro padrão da média
Using this mode was increasing my quality of life.	,00	127	3,22	1,266	,112
	1,00	119	4,25	1,075	,099
I could rely on this mode for my mobility.	,00	127	3,71	1,183	,105
	1,00	119	4,35	1,005	,092
I would recommend this mode to others.	,00	127	3,77	1,216	,108
	1,00	119	4,10	1,160	,106
No other mode could satisfy my mobility needs that well as this one.	,00	127	2,89	1,427	,127
	1,00	119	3,49	1,413	,130
This mode was the only available means of transport I had.	,00	127	2,88	1,562	,139
	1,00	119	3,21	1,578	,145
I continue using this mode today.	,00	127	3,39	1,548	,137
	1,00	119	4,37	1,126	,103

Table 21 - Mean differences in the Loyalty towards most used transport mode, according to the public and private transport users.

Variable	Levene test	T-Test	Mann Whitney test	Mean Rank Public transport	Mean Rank Private transport	Decision
Using this mode was increasing my quality of life	0,032	0,000	0,000	95,23	156,67	Reject H0
I could rely on this mode for my mobility	0,126	0,000	0,000	102,36	146,06	Reject H0
I would recommend this mode to others	0,644	0,031	0,006	112,19	135,57	Reject H0
No other mode could satisfy my mobility needs that well as this one.	0,985	0,001	0,001	109,36	138,59	Reject H0
This mode was the only available means of transport I had.	0,787	0,102	0,082	116,06	131,44	Retain H0
I continue using this mode today.	0,000	0,000	0,000	99,69	148,92	Reject H0

Table 22- T-Test, Levene test and Mann-Whitney test (Loyalty towards most used transport* Public/Private transport mode)

III-Personal welfare

Estatísticas de grupo

	Private transport	N	Média	Erro Desvio	Erro padrão da média
I am satisfied with my job condition.	,00	127	3,61	1,273	,113
	1,00	119	4,01	1,175	,108
I am satisfied with my health condition.	,00	127	4,02	1,168	,104
	1,00	119	4,22	1,090	,100
I am satisfied with my life condition.	,00	127	3,76	1,200	,106
	1,00	119	4,16	1,025	,094
I am satisfied with the location of my house.	,00	127	4,20	1,024	,091
	1,00	119	4,29	,986	,090
The conditions of my life are excellent.	,00	127	3,50	1,038	,092
	1,00	119	3,83	1,003	,092
I am extremely satisfied with my life.	,00	127	3,55	1,082	,096
	1,00	119	3,92	1,070	,098
In most ways my life is close to my ideal.	,00	127	3,28	1,239	,110
	1,00	119	3,68	1,157	,106

Table 23 - Mean differences between personal welfare among public and private transport users

Personal welfare

Variable	Levene test	T-Test	Mann-Whitney test	Mean Rank Public transport	Mean Rank Private transport	Decision
I am satisfied with my job condition	0,017	0,011	0,008	112,30	135,45	Reject H0
I am satisfied	0,746	0,161	0,127	117,32	130,09	Retain H0

with my health condition						
I am satisfied with my life condition	0,053	0,005	0,005	111,81	135,97	Reject H0
I am satisfied with the location of my house.	0,398	0,449	0,446	120,46	126,75	Retain H0
The conditions of my life are excellent	0,091	0,011	0,007	112,22	135,54	Reject H0
I am extremely satisfied with my life.	0,139	0,008	0,002	110,65	137,22	Reject H0
In most ways my life is close to my ideal.	0,238	0,009	0,008	112,31	135,44	Reject H0

Table 24- Differences regarding personal welfare between public transport and car users.

Annexes H- Travel well-being differences between men and women

I- Travel well-being differences between men and women

Estatísticas de grupo

	Gender	N	Média	Erro Desvio	Erro padrão da média
Travelling by this mode was enjoyable.	Male	101	4,22	,986	,098
	Female	145	3,99	1,320	,110
Even in rush-hours, I was pleased with this mode.	Male	101	2,99	1,459	,145
	Female	145	3,02	1,521	,126
Travelling by this mode was giving me valuable personal time.	Male	101	3,68	1,371	,136
	Female	145	3,41	1,521	,126

Due to the long time I was spending in this mode, I didn't have time for the people living in my household, shopping and other activities.	Male	101	2,59	1,274	,127
	Female	145	2,58	1,368	,114
This mode was the best option I had available.	Male	101	4,15	1,071	,107
	Female	145	4,21	1,180	,098
Travelling by this mode was not affecting my feelings.	Male	101	3,72	1,209	,120
	Female	145	3,59	1,372	,114
I would never leave this mode for another transport mode.	Male	101	2,94	1,340	,133
	Female	145	2,86	1,467	,122

Table 49- Mean differences between men and women regarding travel well-being

Variable	Levene test	T-Test	Mann-Whitney	Mean Rank Men	Mean Rank Women	Decision
Travelling by this mode was enjoyable	0,002	0,128	0,549	126,49	121,42	Retain h0
Even in rush hours, I was pleased with this mode	0,261	0,875	0,839	122,42	124,25	Retain H0
Travelling by this mode was giving me personal time.	0,029	0,139	0,212	130,95	118, 94	Retain H0
Due to the long time, I was spending in this mode, I didn’t have time for the people living in my household, shopping and other activities.	0,287	0,932	0,834	124, 61	122,73	Retain H0
This mode	0,462	0,658	0,295	118,34	127,10	Retain H0

was the best option I had available						
Travelling by this mode was not affecting my feelings	0,107	0,445	0,637	125,98	121,78	Retain H0
I would never leave this mode for another transport mode	0,152	0,642	0,630	126,06	121,72	Retain H0

Table 50- Tests results regarding travel well-being and gender

II- Loyalty towards most used transport and gender

Estatísticas de grupo

	Gender	N	Média	Erro Desvio	Erro padrão da média
Using this mode was increasing my quality of life.	Male	101	3,86	1,077	,107
	Female	145	3,62	1,405	,117
I could rely on this mode for my mobility.	Male	101	4,11	,989	,098
	Female	145	3,96	1,241	,103
I would recommend this mode to others.	Male	101	4,00	1,030	,102
	Female	145	3,88	1,304	,108
No other mode could satisfy my mobility needs that well as this one.	Male	101	3,07	1,298	,129
	Female	145	3,26	1,545	,128
This mode was the only available means of transport I had.	Male	101	2,77	1,476	,147
	Female	145	3,23	1,619	,134
I continue using this mode today.	Male	101	3,88	1,359	,135
	Female	145	3,85	1,506	,125

Table 51- Mean differences between gender and loyalty towards most used transport mode

Variable	Levene test	T-Test	Mann-Whitney	Mean Rank Men	Mean Rank Women	Decision
Using this mode was increasing	0,000	0,130	0,411	127,80	120,51	Retain H0

my quality of life						
I could rely on this mode for my mobility	0,015	0,293	0,749	125,13	122,36	Retain H0
I would recommend this mode to others	0,004	0,432	0,992	123,45	123,54	Retain H0
No other mode could satisfy my mobility needs as this one.	0,000	0,308	0,234	117,17	127,91	Retain H0
This mode was the only available means of transport I had.	0,031	0,023	0,025	111,65	131,75	Reject H0
I continue using this transport today.	0,084	0,861	0,647	121,19	125,11	Retain H0

Table 52- Tests between gender and loyalty towards most used transport mode

III-Personal welfare

Estatísticas de grupo

	Gender	N	Média	Erro Desvio	Erro padrão da média
I am satisfied with my job condition.	Male	101	3,83	1,150	,114
	Female	145	3,78	1,304	,108
I am satisfied with my health condition.	Male	101	4,06	1,147	,114
	Female	145	4,15	1,126	,094
I am satisfied with my life condition.	Male	101	3,93	1,134	,113
	Female	145	3,97	1,139	,095
I am satisfied with the location of my house.	Male	101	4,13	,976	,097
	Female	145	4,32	1,020	,085
The conditions of my life are	Male	101	3,65	,994	,099

excellent.	Female	145	3,66	1,062	,088
I am extremely satisfied with my life.	Male	101	3,82	1,033	,103
	Female	145	3,66	1,126	,093
In most ways my life is close to my ideal.	Male	101	3,43	1,211	,121
	Female	145	3,50	1,220	,101

Table 53- Gender differences in what concerns personal welfare

Variable	Levene test	T-Test	Mann-Whitney	Mean Rank Men	Mean Rank Women	Decision
I am satisfied with my job condition	0,2	0,75	0,96	123,22	123,7	Retain H0
I am satisfied with my health condition	0,76	0,53	0,52	120,24	125,77	Retain H0
I am satisfied with my life condition	0,85	0,81	0,79	122,12	124,46	Retain H0
I am satisfied with the location of my house	0,35	0,13	0,02	112,32	131,29	Reject H0
The conditions of my life are excellent.	0,69	0,95	0,73	121,69	124,69	Retain H0
I am extremely satisfied with my life	0,32	0,26	0,34	128,58	120,08	Retain H0
In most ways my life is close to my ideal	0,85	0,62	0,58	120,56	125,55	Retain H0

Table 54- Personal welfare and gender mean differences

Annex I - Crombach Alpha/Pre-test

Item	Cronbach (α)
Household responsibilities	0,590
Public transport	
Reliability	0,878
Security	0,832
Comfort and Services	0,598
Perceived satisfaction and measures to increase security	0,623
Private transport	
Perceived security	0,619
Measures to increase security	0,745
Perceived satisfaction and intentions to use public transport	0,662
Travel well-being and Loyalty	0,794
Personal welfare	0,896

Table 70- AlfaCrombach

Annex J- Crosstabulations

Comfort and Overall satisfaction

Variable	Tau-b	Tau-c	Sommer's D	Gamma	Significance
There were enough seats.	0,318	0,290	0,318	0,429	0,000
The seats were comfortable	0,488	0,463	0,471	0,623	0,000
There were too many people in the transport mode	0,120	0,073	0,179	0,224	0,147
The transport mode, as well the station/stop, had a clean aspect	0,357	0,358	0,346	0,466	0,000

I didn't feel comfortable travelling with people I don't know.	-0,252	-0,234	-0,248	-0,332	0,001
It was hard to use this transport mode when travelling with children.	-0,197	-0,181	-0,195	-0,264	0,008
It was hard to use this transport mode when travelling with shopping bags or luggage	-0,156	-0,144	-0,154	-0,207	0,050
I like seeing people and having other people around me in this mode	0,022	0,021	0,022	0,030	0,778
In this transport mode, I found people, noise and smells surrounding me unpleasant.	-0,253	-0,237	-0,247	-0,335	0,000

Table 61- Comfort and "Overall I was satisfied with this transport mode

Overall satisfaction and services

Variable	**Tau-b**	**Tau-c**	**Sommer's D**	**Gamma**	**Significance**
The staff was always available for helping	0,354	0,331	0,347	0,463	0,000
Onboard, I was informed about delays.	0,282	0,257	0,284	0,386	0,000
It was easy to use applications for this transport mode	0,345	0,328	0,333	0,449	0,000
The mobile applications were accurate	0,283	0,267	0,274	0,371	0,000

I was considering the monthly pass affordable considering the trips that I made and I wanted	0,364	0,326	0,372	0,486	0,000
The prices of the tickets were reasonable	0,337	0,317	0,328	0,437	0,000
It was easy to buy tickets.	0,321	0,299	0,316	0,424	0,000
I was spending less on the monthly pass that allowed me to travel in the metropolitan area compared to expenses related to a vehicle (mainly fuel and maintenance)	0,219	0,188	0,233	0,314	0,000

Table 62- Overall satisfaction and services

Security and "Overall I was satisfied with this transport mode"

Variable	**Tau-b**	**Tau-c**	**Sommer's D**	**Gamma**	**Significance**
I was feeling safe using this mode during the day	0,413	0,352	0,443	0,573	0,000
I was feeling safe using this mode at night	0,249	0,236	0,240	0,324	0,001
I was feeling safe while waiting in the station/stop of the	0,385	0,355	0,382	0,503	0,000

mode I use the most					
I was feeling safe walking to the station/stop of the mode I use the most	0,385	0,353	0,386	0,511	0,000
My family/friends were not worried about me using this mode at night.	0,252	0,239	0,242	0,327	0,001
My family/friends thought this mode was safe	0,294	0,277	0,286	0,380	0,000
The stations/stops were well illuminated	0,402	0,369	0,400	0,532	0,000
There was someone patrolling the stations especially at night.	0,124	0,107	0,132	0,181	0,100
Campaigns about awareness towards security were satisfactory.	0,123	0,115	0,121	0,165	0,121
The surveillance system in the stations/stops of this mode was satisfactory.	0,207	0,191	0,204	0,278	0,005
The surveillance system makes me feel safe when I use this mode, even if I am in a problematic area of the	0,205	0,190	0,202	0,274	0,005

city/suburbs.					
The environment around the stations/stops of this mode makes me feel safe	0,331	0,312	0,322	0,436	0,000
The response in case of an emergence/attack by the police and the transport operator was quick and coordinated	0,215	0,192	0,220	0,296	0,004
Using this mode, didn't prevent me from travelling at night by this mode to see my friends and family.	0,300	0,284	0,289	0,389	0,000
I had been subject of an attempted assault and/or robbery while waiting for the mode I use the most.	-0,240	-0,173	-0,305	-0,396	0,001
I had been subject of an attempted assault and/or robbery inside the mode I use the most.	-0,192	-0,140	-0,241	-0,318	0,007
I had felt harassed inside the mode I	-0,141	-0,121	-0,150	-0,200	0,042

use the most.					
I had felt harassed while waiting in a station/stop for the mode I use the most.	-0,187	-0,160	-0,200	-0,265	0,009

Table 63- Overall satisfaction and security

Reliability and Overall satisfaction of public transport users

Variable	**Tau-b**	**Tau-c**	**Sommer's d**	**Gamma**	**Significance**
The time I was waiting for the next vehicle is acceptable	0,357	0,331	0,353	0,469	0,000
I was arriving fast from my departure point to my destination	0,430	0,399	0,423	0,552	0,000
The frequency of the schedule was acceptable	0,480	0,448	0,469	0,625	0,000
There was a lot of variability in what concerns the waiting time.	0,028	0,027	0,027	0,036	0,730
The mode was arriving when expected.	0,486	0,453	0,478	0,628	0,000
I never had delays due to technical problems.	0,243	0,214	0,252	0,342	0,000
When technical problems occurred, the information was	0,211	0,198	0,206	0,278	0,005

immediately communicated to the passengers					
I didn't have to make many transfers using this mode.	0,358	0,335	0,349	0,464	0,000
The waiting time when I was changing transport mode or line was short.	0,338	0,317	0,329	0,434	0,000
Whenever I wanted to travel, there were connections of this mode close by	0,247	0,230	0,242	0,322	0,002
With this mode, I always had available connections to my destination.	0,281	0,259	0,278	0,373	0,000
With this mode, I always had available connections to other public transport modes.	0,287	0,259	0,291	0,378	0,000
With this mode, it was more advantageous to travel to points of the city that are closed to circulation and parking (historic centres)	0,260	0,243	0,254	0,338	0,001
Moving and orienting myself within the	0,269	0,241	0,276	0,365	0,000

stations/stops of this mode was easy.					
It was easy to get on and off this mode	0,335	0,301	0,340	0,451	0,000
It was easy to get on and off this mode with baby trolleys, shopping bags, luggage or wheelchairs.	0,285	0,267	0,278	0,375	0,000

Table 64- Reliability and overall security

Variable	**Tau-b**	**Tau-c**	**Sommer's D**	**Gamma**	**Significance**
The time I was waiting for the next vehicle is acceptable	0,285	0,262	0,278	0,382	0,000
I was arriving fast from my departure point to my destination	0,252	0,232	0,246	0,336	0,001
The frequency of the schedule was acceptable	0,362	0,335	0,351	0,477	0,000
There was a lot of variability in what concerns the waiting time.	-0,050	-0,047	-0,048	-0,065	0,558
The mode was arriving when expected.	0,372	0,344	0,362	0,492	0,000
I never had delays due to technical problems.	0,219	0,192	0,226	0,316	0,001
When technical problems occurred, the information	0,224	0,208	0,216	0,299	0,002

was immediately communicated to the passengers					
I didn't have to make many transfers using this mode.	0,202	0,188	0,195	0,267	0,010
The waiting time when I was changing transport mode or line was short.	0,204	0,189	0,197	0,266	0,007
Whenever I wanted to travel, there were connections of this mode close by	0,213	0,196	0,207	0,281	0,007
With this mode, I always had available connections to my destination.	0,236	0,216	0,232	0,317	0,001
With this mode, I always had available connections to other public transport modes.	0,283	0,253	0,284	0,378	0,000
With this mode, it was more advantageous to travel to points of the city that are closed to circulation and parking (historic centres)	0,168	0,155	0,163	0,222	0,029
Moving and orienting	0,164	0,145	0,166	0,226	0,037

myself within the stations/stops of this mode was easy.					
It was easy to get on and off this mode	0,235	0,210	0,237	0,319	0,003
It was easy to get on and off this mode with baby trolleys, shopping bags, luggage or wheelchairs.	0,298	0,277	0,288	0,399	0,000

Table 65- Reliability and Loyalty

Comfort and travel well-being

Variable	**Tau-b**	**Tau-c**	**Sommer's d**	**Gamma**	**Significance**
There were enough seats	0,212	0,198	0,217	0,282	0,003
The seats were comfortable	0,356	0,345	**0,352**	0,449	0,000
There were too many people in the transport mode, especially in the rush-hour	0,106	0,066	0,162	0,207	0,103
The transport mode, as well the station/stop has a clean aspect	0,235	0,228	0,233	0,300	0,002
I didn't feel comfortable travelling with people	-0,177	-0,168	-0,178	-0,230	0,015

that I don't know.					
It was hard to use this transport mode when travelling with children	-0,138	-0,130	-0,141	-0,182	0,074
It was hard to use this transport mode when travelling with shopping bags or luggage	-0,097	-0,092	-0,098	-0,126	0,242
I liked seeing people and having other people around me this mode.	0,087	0,082	0,088	0,113	0,278
In this transport mood, I found people, noise and smells surrounding me unpleasant.	-0,058	-0,056	-0,058	-0,075	0,428

Table 66- Comfort and Travel well-being

Security and loyalty towards public transportation

Variable	**Tau-b**	**Tau-c**	**Sommer's d**	**Gamma**	**Significance**
I was feeling safe using this mode during the day	0,266	0,224	0,081	0,374	0,001
I was feeling safe using this	0,155	0,146	0,075	0,204	0,047

mode at night					
I was feeling safe while waiting in the station/stop of the mode I use the most	0,116	0,106	0,071	0,157	0,106
I was feeling safe walking to the station/stop of the mode I use the most	0,100	0,091	0,099	0,135	0,163
My family/friends were not worried about me using this mode at night.	0,077	0,073	0,074	0,101	0,284
My family/friends thought this mode was safe	0,084	0,078	0,081	0,111	0,275
The stations/stops were well illuminated	0,175	0,160	0,173	0,235	0,020
There was someone patrolling the stations especially at night.	0,134	0,114	0,141	0,196	0,060
Campaigns about awareness towards security were satisfactory.	0,055	0,051	0,053	0,074	0,447
The surveillance system in the stations/stops of this mode was satisfactory.	0,063	0,058	0,062	0,086	0,362
The surveillance system makes me feel safe when I use this mode, even if I	0,099	0,091	0,070	0,134	0,166

am in a problematic area of the city/suburbs.					
The environment around the stations/stops of this mode makes me feel safe	0,184	0,171	0,071	0,244	0,013
The response in case of an emergence/attack by the police and the transport operator was quick and coordinated	0,114	0,100	0,077	0,158	0,136
Using this mode, didn't prevent me from travelling at night by this mode to see my friends and family.	0,176	0,165	0,075	0,229	0,024
I had been subject of an attempted assault and/or robbery while waiting for the mode I use the most.	-0,070	-0,050	-0,088	-0,121	0,329
I had been subject of an attempted assault and/or robbery inside the mode I use the most.	-0,053	-0,038	-0,066	-0,090	0,480
I had felt harassed inside the mode I use the most.	-0,012	-0,010	-0,013	-0,018	0,870
I had felt harassed while waiting in a station/stop for the mode I use	-0,075	-0,063	-0,079	-0,109	0,319

the most.					

Table 67- Security and Loyalty

Variable	Tau-b	Tau-c	Somer's D	Gamma	Significance
The staff was always available for helping.	0,201	0,193	0,202	0,259	0,005
Onboard, I was informed about delays	0,039	0,036	0,040	0,052	0,598
It was easy to use applications for this transport mode	0,212	0,206	0,210	0,270	0,003
The mobile applications were accurate.	0,153	0,148	0,152	0,196	0,046
I was considering the monthly pass affordable considering the trips that I made and I wanted.	0,123	0,113	0,129	0,165	0,102
The price of the tickets was reasonable.	0,112	0,108	0,112	0,144	0,141
It was easy to buy tickets.	0,253	0,241	0,255	0,323	0,000
I was spending less on the monthly pass that allowed me to travel in the metropolitan area compared to expenses related to a vehicle (mainly fuel and	0,074	0,666	0,081	0,104	0,348

maintenance)					

Table 68- Services and Travel well-being

Variable	Tau-b	Tau-c	Somer's D	Gamma	Significance
The staff was always available for helping.	0,055	0,050	0,052	0,075	0,471
Onboard, I was informed about delays	-0,111	-0,098	-0,108	-0,153	0,151
It was easy to use applications for this transport mode	0,021	0,020	0,020	0,029	0,787
The mobile applications were accurate.	0,128	0,118	0,121	0,174	0,073
I was considering the monthly pass affordable considering the trips that I made and I wanted.	0,028	0,025	0,028	0,040	0,714
The price of the tickets was reasonable.	-0,122	-0,112	-0,115	-0,165	0,100
It was easy to buy tickets.	0,094	0,085	0,090	0,127	0,221
I was spending less on the monthly pass that allowed me to travel in the metropolitan area compared to expenses related to a vehicle (mainly fuel and	0,127	0,106	0,131	0,182	0,102

maintenance)					

Table 69- Services and loyalty

Annex K- ANOVA

ANOVA

1- Measures to increase the security in the public transport and monthly net income

Variable	Levene test	ANOVA	Tukey	Decision
There should be an application in the smartphone to have a more personalized contact with the transport provider/police to alert towards dangerous situations	0,237	0,240	0,177	Retain H0
There should be contact posts in the stations in order to contact the public transportation provider and the police towards dangerous situations in order to increase the existent feeling of being safe.	0,544	0,269	0,051	Retain H0
The staff should guarantee passengers security onboard	0,203	0,306	0,108	Retain H0
There should exist Wi-Fi connection at the station/stop at the mode I use the most so that I contact people that I know in case of emergency.	0,144	0,388	0,764	Retain H0
At night, the mode should be have flexible schedules to suit passenger's needs.	0,081	0,170	0,141	Retain H0
At night, the mode should be able to let passengers at any point of the route.	0,062	0,161	0,356	Retain H0
I am willing to pay more so that the operator installs contact posts and wi-fi in the mode I use the most.	0,465	0,535	0,719	Retain H0
I am willing to pay more in order to have access to car-sharing services combined	0,541	0,285	0,811	Retain H0

with the public transport mode I use the most.				
I feel safer using a carpool system or platforms like Uber, Taxify, Cabify, than using this mode at night.	0,05	0,300	0,200	Retain H0
I feel safer travelling by car at night.	0,213	0,675	0,436	Retain H0
I feel safer using a carpool system or platforms like Uber, Taxify, Cabify than using this mode at any time of the day.	0,645	0,898	0,735	Retain H0
I feel safer travelling by car at any time of the day.	0,631	0,952	0,963	Retain H0

Table 55- Measures to increase the security in the public transport and monthly net income

2- Reliability and time spent in public transportation

Variable	**Levene test**	**ANOVA**	**Tukey**	**Decision**
The time I was waiting for the next vehicle is acceptable.	0,936	0,940	0,959	Retain H0
I was arriving fast from my departure point to my destination	0,838	0,015	0,114/0,437	Retain H0
The frequency of the schedules was acceptable.	0,694	0,999	0,998	Retain H0
There was a lot of variability in what concerns the waiting time.	0,022	0,541	0,479	Retain H0
The mode was arriving when expected.	0,694	0,482	0,582	Retain H0
I never had delays due to technical problems of this mode.	0,524	0,921	0,920	Retain H0
When technical problems occurred,	0,346	0,720	0,697	Retain H0

the information was immediately communicated to the passengers.				
I didn´t have to make many transfers using this mode.	0,001	0,000	1/0,094	Retain H0
The waiting time when I was changing transport mode or line was short.	0,640	0,336	0,458	Retain H0
Whenever I wanted, there were connections of this mode close by.	0,955	0,846	0,885	Retain H0
With this mode, I always had available connections to my destination.	0,623	0,821	0,797	Retain H0
With this mode, I always had available connections to other public transport modes.	0,225	0,449	0,363	Retain H0
With this mode, it was more advantageous to travel to points of the city that are closed to circulation and parking (namely historic centres)	0,039	0,117	0,079	Retain H0
Moving and orienting myself within the stations/stop of this mode was easy.	0,663	0,309	0,236	Retain H0
It was easy to get on and off this mode.	0,385	0,237	0,146	Retain H0
It was easy to get on and off this mode with baby trolleys, shopping bags, luggage or wheelchairs.	0,319	0,556	0,501	Retain H0

Table 56- Reliability and time spent in public transportation

3- Travel well-being and most used transport mode

Variable	Levene test	ANOVA	Tukey	Decision
Travelling by this mode was enjoyable.	0,079	0,153	0,465	Retain H0
Even in rush-hours, I was pleased with this mode.	0,020	0,588	0,786	Retain H0
Travelling by this mode was giving me valuable personal time	0,469	0,163	0,486	Retain H0
Due to the long time I was spending in this mode, I didn't have time for the people living in my household, shopping and other activities.	0,278	0,348	0,576	Retain H0
This mode was the best option I had available.	0,791	0,844	0,965	Retain H0
Travelling by this mode was not affecting my feelings.	0,260	0,499	0,839	Retain H0
I would never leave this mode for another transport mode.	0,424	0,322	0,216	Retain H0

Table 57-Travel well-being and most used transport mode

4- Travel well-being and loyalty towards transport

Variable	Levene test	ANOVA	Tukey	Decision
Using this mode was increasing my	0,903	0,501	0,616	Retain H0

quality of life.				
I could rely on this mode for my mobility.	0,035	0,098	0,482	Retain H0
I would recommend this mode to others.	0,000	0,040	0,471	Retain H0
No other mode could satisfy my mobility needs that well as this one.	0,969	0,440	0,728	Retain H0
This mode was the only available means of transport I had.	0,044	0,002	0,051	Retain H0
I continue using this mode today.	0,446	0,234	0,271	Retain H0

Table 58-Travel well-being and loyalty towards transport

5- Personal welfare and most used public transport mode

Variable	**Levene test**	**ANOVA**	**Tukey**	**Decision**
I am satisfied with my job condition.	0,823	0,938	0,925	Retain H0
I am satisfied with my health condition.	0,628	0,852	0,882	Retain H0
I am satisfied with my life condition.	0,302	0,151	0,587	Retain H0
I am satisfied with the location of my house.	0,198	0,714	0,920	Retain H0
The conditions of my life are excellent.	0,535	0,342	0,626	Retain H0
I am extremely satisfied with my life.	0,104	0,166	0,632	Retain H0
In most ways my life is close to my ideal.	0,998	0,805	0,615	Retain H0

Table 59-Personal welfare and most used public transport mode

6- Services and travel well-being

Variable	Levene	ANOVA	Tukey	Decision
The staff was always available for helping	0,239	0,058	0,270	Retain H0
Onboard, I was informed about delays	0,108	0,090	0,592	Retain H0
It was easy to use applications for this transport mode	0,428	0,051	0,450	Retain H0
The mobile applications were accurate	0,792	0,179	0,086	Retain H0
I was considering the monthly pass affordable considering the trips that I made and I wanted	0,481	0,283	0,228	Retain H0
The price of the tickets were reasonable.	0,458	0,309	0,250	Retain H0
It was easy to buy tickets	0,101	0,001	0, 347	Retain H0
I was spending less on the monthly pass that allowed me to travel in the metropolitan area compared to expenses related to a vehicle(mainly fuel and maintenance)	0,052	0,403	0,348	Retain H0

Table 60- Services and well-being

7- Services and loyalty

Variable	Levene	ANOVA	Tukey	Decision
The staff was always available for helping	0,637	0,163	0,506/0,206	Retain H0
Onboard, I was informed about delays.	0,103	0,008	0,518/0,089	Retain H0
It was easy to use applications for this transport mode	0,430	0,795	0,902	Retain H0
The mobile applications were accurate	0,488	0,323	0,526	Retain H0
I was considering the monthly pass affordable considering the trips that I made and I wanted	0,763	0,772	0,452	Retain H0
The price of the tickets were reasonable	0,965	0,497	0,769	Retain H0
It was easy to buy tickets.	0,892	0,124	0,322	Retain H0
I was spending less on the monthly pass that allowed me to travel in the metropolitan area compared to expenses related to a vehicle(mainly fuel and maintenance)	0,171	0,036	0,106/0,303	Retain H0

Table 61- Current services and loyalty