ISCTE ⬤ Business School
Instituto Universitário de Lisboa

ATTITUDE AND INTENTION TO USE CARSHARING IN
PORTUGAL: USERS AND NON-USERS

Rita Martinho Rosa

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Prof. Mónica Montes Mendes Rocha Ferreira, Invited Assistant Professor, ISCTE
Business School, Department of Marketing, Operations and General Management

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Abstract

Carsharing is a service that allows the rental of a car to the minute, providing more flexibility to the user. This service appeared in 1948 in Switzerland but it has been growing due to the awareness of Shared Mobility.

Carsharing concept has been approached by several researchers. However, there is not so much literature about Portuguese market.

The impacts of carsharing are known to be the reduction of CO^2 emissions since it contributes to the reduction of the number of cars parked and in circulation in the big cities (1), the inclusion of all fixed costs in the final price, as the user only pays the miles he drives (2) and the flexibility carsharing gives the users to move around in the city (3).

This study's goal is to understand the Portuguese perception of carsharing use, taking into account benefits such as convenience, environmental impact and costs considerations. It is also crucial to understand the level of service knowledge among Portuguese people, since this factor can influence the perception and a possible intention to use it.

It turns out that most of the Portuguese know what carsharing is but do not know very well how it works. In general, the Portuguese people, whether users or non-users, do not see carsharing as a cheap service, but consider the service convenient. As far as environmental impact is concerned, attitudes differ. Users have a positive attitude regarding carsharing impact on the environment, while non-users have a negative attitude.

This perception impacts on the attitude of users and non-users. While the former has a positive attitude towards the use of carsharing, the same cannot be concluded from the latter. Most users intend to continue to use carsharing, unlike most non-users who do not want to try the service.

Resumo

O *carsharing* é um serviço que permite o aluguer de um carro ao minuto, proporcionando mais flexibilidade ao utilizador. Este serviço apareceu pela primeira vez em 1948 na Suíça e tem vindo a crescer devido à popularidade do fenómeno da Mobilidade Partilhada.

O *carsharing* tem sido um conceito muito abordado por investigadores estrangeiros, nunca tendo sido muito investigado em Portugal. Os impactos do *carsharing* são conhecidos por ser a redução de emissões de CO^2 uma vez que contribui para a diminuição do número de carros estacionados e em circulação nas grandes cidades (1), a não inclusão de custos fixos que a utilização de carro próprio acarreta no preço final- o utilizador só paga os quilómetros que conduz (2) e a flexibilidade que dá aos utilizadores para se movimentarem na cidade (3).

Este estudo tem como objetivo perceber qual é a perceção dos portuguese face à utilização do *carsharing*, tendo em conta benefícios como a conveniência, o impacto ambiental e fatores económicos. Torna-se crucial perceber também o nível de conhecimento do serviço por parte dos portugueses, uma vez que este fator pode influenciar a perceção e uma possível intenção de utilização do mesmo.

Conclui-se que a maior parte dos portugueses sabe o que é *carsharing* mas não sabe muito bem como funciona. Em geral, os portugueses, quer utilizadores quer não utilizadores, não veem o *carsharing* como um serviço barato, mas consideram o serviço conveniente. No que diz respeito ao impacto ambiental, as atitudes divergem. Os utilizadores têm uma atitude positiva quanto ao impacto do *carsharing* no ambiente, enquanto os não utilizadores têm uma atitude negativa.

Esta perceção impacta na atitude dos utilizadores e não utilizadores. Enquanto que os primeiros têm uma atitude positiva face à utilização de *carsharing*, já não se pode concluir o mesmo dos segundos. Na sua maioria os utilizadores pretendem continuar a utilizar *carsharing*, ao contrário da maioria dos não utilizadores que não pretende experimentar o serviço.

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1. Introduction of the Topic

In recent years, technological developments coupled with economic, environmental and social forces have contributed to the growth of an economy that prioritizes access and sharing over ownership of goods and services through online networks or platforms - the Sharing Economy (Cheng, 2016; Hamari *et al*., 2015; Owyang, 2013; Bardhi and Eckhardt, 2012; Botsman and Rogers, 2011; Rifkin, 2000; Gansky, 2010). From this phenomenon of sharing, was born Shared Mobility.

As Brisa company's president, Vasco Mello (2017) referred the mobility sector is living a "silent revolution". Worldwide population is growing and moving to big cities at the same time that new services are coming to the market transforming cities' urban planning and the way people travel (Cohen and Shaheen, 2018).

Carsharing is one of that new Shared Mobility services that emerged recently and that has a more transformative impact. Consumers have access to a fleet of shared vehicles through an application (App) and only pay the time they use the car or the kilometers they drive. Parking, fuel and insurance are included in the price. This system provides to its users the benefits of a private vehicle, as convenience, and also removes the burdens of owning one – fixed costs. Besides that, carsharing massive use also has a positive impact on environment, more specifically on CO_2 emissions, while carsharing increases the average daily usage time per car while the number of cars in circulation and the time spent stationary decreases.

Although carsharing has been an existing service for 30 years, its recent growth and popularity make it an emerging phenomenon. In Portugal, the service appeared for the first time in 2014 but was only in 2016 that it started to gain some popularity. Carsharing operators are still in the process of developing and learning about the business model and understanding what consumers are looking for in carsharing to meet their needs.

Furthermore, there is a lack of information and some gaps in the literature related to the perception of consumers and the reasons of use and non-use of the service. Although carsharing has a major environmental impact, the economic and convenience issues are seen as major advantages to use this service (Moeller and Wittkowski, 2010; Bardhi and Eckhardt, 2012; Möhlmann, 2015; Hamari *et al*., 2015). On the other hand, consumers show a positive attitude towards using carsharing, but this is not translated

into intentions to use the service (Hamari *et al*., 2015).

As a recent service in Portugal, it is important to understand who are the users of carsharing, how they perceive the service and the reasons why they use the service. On the other hand, it is also important to realize the reasons why non-members do not use the service and its perception of it.

This thesis is going to study the attitude and the intention to use carsharing in Portugal. It will follow the structure of a scientific work, dividing it into two parts.

In the first part, the paradigm of the current global mobility sector will be explained. Then, it will be addressed the global market of carsharing, its history, the impacts of its use and the perceptions that consumers have about the service. The authors will make a more in-depth analysis regarding the Portuguese mobility sector and the space that carsharing occupies in this sector.

The second part will consist of testing the hypothesis model developed by the authors and come to the final conclusions about the knowledge people have about carsharing, which factors positively influence the attitude towards the service and whether the intention to use it is positive or not.

2. Research Question and Objectives

In Portugal, there are three carsharing companies in the city of Lisbon. The service has gained more popularity in the last 2 years, so it became important to understand if portuguese know how carsharing actually works, what they think about the service and if they intend to use it. Thus, the main objectives of this dissertation are:

- perceive the general perception of carsharing and attraction of the service in Portugal;

- understand what is the main factor about carsharing that consumers and non-consumers value the most;

- understand in what values the brands present in the market should focus on, in order to retain customers and attract new ones.

To achieve these objectives, authors must answer the following questions:

- Do the Portuguese know how Carsharing works?

- Is the attitude about using carsharing positive or negative?

- What are the factors that have a positive impact on the attitude?

- Is the intention to use carsharing positive or negative? Why?

The present work will provide further information to managers in order to understand if they are approaching well the Portuguese market and if there are opportunity and potential to expand to other Portuguese cities. Companies that understand well its clients and the market are poised to have a competitive advantage.

3. Literature Review

3.1. Access versus Ownership versus Sharing

Consumers identify with their possessions, as goods become a part of themselves (Belk, 1988). However, ownership has its burdens. According to Moeller and Wittkowski (2010), ownership embrace the risks of product alteration and obsolescence, as well the responsibility of maintenance and repair and all the costs inherent to its utilization.

Therefore, there is an emergent consumption pattern that consists of the preference for share and access goods and services instead of owning or buying them (Cheng, 2009). Ownership is no longer the only and the preferred way of consumption (Cheng 2009; Marx 2011), in part, due to the increase of prices and costs during the product ownership life and the change occurred among social relationships, in which "*people with similar interests are banding together to share and exchange less tangible assets such as time, space, skills, and money*" (Botsman and Rogers 2010: 73).

Access can be defined as a temporary consumption of a good/service for a fee (Belk, 2014), in which there is not transfer of ownership (Cheng, 2009). Consumers are allowed to use the good or experience the service, during a specific period of time, that otherwise could not afford to own or buy due to space or economic constraints.

Ownership perception as a reflection of "*who we are is of what we own*" (Rifkin, 2000: 1) is changing as individuals are more open to new ways of consumption (Botsman and Rogers, 2011; Bardhi and Eckhardt, 2012) and are more likely to use digital tools, becoming more interactive and connected with each other.

In its turn, sharing is defined as "*the act and process of distributing what is ours to others for their use, and/or the act and process of receiving or taking something from others for our own use*" (Belk 2007: 126). Despite of being modes of consumption that not covers the transfer of ownership, access and sharing differ in one point. While sharing does not require an economic return to the person or company who is sharing the good, access implies an utilization fee. Althought it doesn't involve economic transactions, the

most known services of access have sharing on its name concept, as carsharing.

The rapid growth of the sharing economy is generally attributed to the fact that it is based on existing capacity that is under-utilized, which explains why scaling can occur so fast. Nevertheless, the boom of collaborative economy and consumption relied on (1) developments in information and communications technologies; (2) values shift among consumers and companies, which translates in a more openness regarding ways of consumption; (3) economic realities as consumers pursuit a better value for money, as some of many crisis concerns have remained; and (4) an increasing environmental awareness, which translates into a consumption change according to an eco-friendlier lifestyle (Rifkin, 2000; Cheng, 2007; Lamberton and Rose, 2012; Owyang, 2013; Hamari *et al*, 2015).

In the "*new network economy*" (Rifkin, 2000:1), goods and services are more likely to be accessed than acquired. According to the author, "*We are making a long-term shift from industrial to cultural production*" (Rifkin, 2000: 1), as more and more consumers will become experiences creators' and have access to others' experiences (Rifkin, 2000). Economists call this paradigm the "*experience economy*". Owyang (2013: 4) define it as "*an economic model where ownership and access are shared between corporations, startups, and people*".

The perspective of consumers toward value is changing as they access goods and services having in account the time and energy they expend and also the impact that this action can have in terms of environment. Mobile developments make consumers more comfortable in doing social and monetary transactions. Digital platforms have a major importance on the increase trend to share as it enables consumers to measure the availability of products and services they want to access and to connect in real time with companies and among themselves. In fact, technology foster social connections. Tien Tzuo, Founder and CEO of Zuora stated that "*Pushing products through a channel to anonymous customers is a 20th century form of business that doesn't make sense anymore. Now that we're always online, always connected, new innovations are launched as services*" (Owyang, 2013:11).

3.2. Mobility Paradigm

The mobility landscape is growing at a fast pace. In 2010, 6.4 billion euros were spent on the transportation of humans and goods. In 2012, mobility accounted for 13% of global GDP (Cornet, A. *et al*., 2012).

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In the recent years, the world population growth and the concentration of population in urban areas has led to increased mobility needs and to the rise of environmental and social issues caused by the massive use of private cars. The willingness of consumers to spend more on mobility have also contributed to the development of new mobility options and, consequently, to the growth of this market.

According to Cornet, A. *et al.* (2012), in 2006, half of the world's population lived in urban areas and by 2050, the consultant estimates that it will reach 70% of the worldwide population. While mobility plays a very important role in big cities, it also causes major problems. The massive automobile usage has negative impacts on the environment, such as high emission CO_2 and high energy costs. This problem allied to the lack of mobility options leads to social problems, such as road congestion and high travel costs (Degirmenci and Breitner, 2014*).*

People are not satisfied with the mobility options available to them. According to the European Mobility Observatory (2017), Portugal is one of the countries that presents a lower average travel time spent between home and office, however 45% of Portuguese are not satisfied with the fluidity of traffic during the rush hour. In compulsory daily journeys, the car is the most widely used means of transport in Europe - 65% of Europeans use it, either by those who live in rural areas, around the city, or even in the center (European Mobility Observatory, 2017). Locally, the majority of Portuguese people questioned in the European Mobility Observatory's study (2017) said they are willing to use more public transport (82%) and to use less their own car (77%) if the necessary investments are made to improve transport infrastructure.

In addition, concerns about the environmental and energy impacts have been growing, especially due to the transport sector. According to José Mendes, the Portuguese Secretary of State and Adjunct of the Environment, "*the mobility of people and the transportation of goods sector now accounts for 15% of the emissions of anthropogenic greenhouse gases. But if we focus only on the emissions that result from the burning of fossil fuels the sector of the mobility of people and transport of goods represents 25% of the emissions. It's a global problem*." (José Mendes, Mobility on The Move Conference, 2017). Understanding the scale of this impact, governments have been developing strategies to reduce this problem and create a more sustainable future, which involves developing more and better mobility solutions.

Many cities around the world have joined to the Travel Demand Management system (TDM) which consists in several measures related to urban traffic, including real-

time travel information provided to citizens, environmental awareness-raising and financial incentives to introduce more sustainable modes of transport (OECDE, 2015). The goal is to increase travel choice, manage parking efficiency and discourage people to choose a car as the main transportation option (Litman, 2000). According to Professor José Viegas (2017), the introduction of more sustainable mobility systems in cities depends on transition management, which in itself depends on cities local conditions.

Consequently, new and more sustainable forms of mobility are emerging, such as an emergent trend called Mobility on Demand (MOD). This is a system based on the use of personalized transport information in real-time, which allows users to find the transport that best suits their needs. This system is only possible due to developments in information and communications technologies (ICT) and the utilization growth of mobile devices. It encourages intermodal, accessible sustainable and connected mobility. carsharing, bikesharing, scooter sharing, public transportation and shuttle services are considered services of Mobility on Demand.

This paradigm of change has been impacting and will greatly impact the automotive market from now on. In fact, there are already more and more companies in the automobile market that are beginning to establish partnerships with other companies, especially with technology ones, in order to create mobility solutions. Some companies are even rethinking their position on the market, identifying themselves as "mobility providers", leaving behind the concept of car manufacturers. As Tony Cannestra, Director of Corporate Ventures at DENSO (2017), says, "*Established industry leaders and startups need to work together to craft products and solutions in the future of transportation.*" It is necessary to place mobility at the heart of the business, since it's important for both consumers and companies, as they are inserted in a context of on-demand economy where standards and expectations only tend to increase.

3.2.1. Shared Mobility

According to a Nielsen survey (2014), this sharing economy is global phenomenon. It has been redefining the role of consumers and changing their relationship with companies. The number of consumers willing to join sharing communities and participate in Sharing Economy services is increasing as they are more spared and environmentally concerned.

From this phenomenon was born Shared Mobility, which is the shared use of a car, motorcycle, bicycle or other mode in a short-term access system. Shared mobility

encompasses several submarkets. Some authors categorize them for the time of use, between sequential-use by one user and then another, as bikesharing, carsharing and scooter sharing and concurrent models, shared by many at one time, as microtransit and carpooling (Transportation Research Board, 2015).

Shared mobility is having a transformative impact on large cities. At the same time that improvement maximizes the transport offer, it increases the accessibility to the transport. As Professor José Viegas stated "*The focus must be the access, of peoples and products access to work, to markets, social interaction and to public functions. Mobility is only a tool to provide access.*" (Mobility on The Move, 2017).

This improvement in accessibility has become possible due to the growing use of smartphones and digital platforms. Technological improvements contribute to the creation of ever-smarter applications to meet the mobility needs of consumers. Increasing availability of real-time information (e.g.: congestion, parking and public transport) makes people increasingly "intelligent and informed mobility consumers" by realizing which option best fits each trip and by making better travel decisions (US Department of Transportation, 2018).

Mobility has become the focus of much government importance and awareness of shared mobility has been increasing as it contributes to the achievement of governmental long-term goals. In this way, local and regional governments are the most common public partners of the shared mobility operators because of their role in planning and their focus on this issue. Public involvement is essential for growth of shared mobility. Public-private partnerships with local governments, public transport companies and universities can play a key role in developing shared mobility to maximize their social and environmental benefits.

The authors would like to highlight some metrics and initiatives proposed by the US Department of Transportation (2018) to be considered by local governments: to reduce parking by encouraging the replacement of parking lots (placing more parking space only for shared vehicles) and better incorporating shared mobility with other modes of local transport, developing general plans and planning processes.

In the next chapter, will be addressed one of the most popular shared mobility service which is also the object of this study: carsharing.

3.2.2. B2C Carsharing

Carsharing is an on-demand transport model that consists in the short-term access to a fleet of cars, in which customers only pay the time of use or kilometers they drive (Schaefers, 2012). There are three carsharing business model: B2B, from companies to companies, B2C, from companies to individual consumers and also C2C, from consumer to consumer. In this dissertation, authors will just consider B2C carsharing as the object of study.

Users have access to a fleet of cars through an App, in which they can localize the nearest car, open the doors and end booking. Most of the time, users can choose the type of car (sedan, coupé, electric, hybrid, etc.) that best suits their needs for a specific trip (Litman, 2000).

This service model is more adequate for local and short trips as the cost becomes really high for long trips (Bardhi and Eckhardt, 2012). Carsharing consumers (carsharers) pay as they go, with low fixed costs but high variable costs. Costs as parking, insurance, fuel and maintenance are incurred with the use of carsharing services. Depending on the company, the client can be asked to pay an annual or initial fee - fixed cost.

Cars are distributed through the city in dedicated parking spaces as stations or on-street, depending on the company operation. Carsharing companies generally pay a fee to the city to have spaces dedicated to shared vehicles (stations) or to allow free parking on the street (U.S Department of Transportation, 2018). Thus, there are three types of Carsharing operation that differ in how customers have access to cars:

a) **One-way free-floating**: the customer can make one-way trips and park the car in any legal on-street parking space within the service area, which requires a permission given by the street parking entity to the carsharing operator (e.g.: DriveNow and Car2Go);

b) **One-way station-based:** the customer has to pick up the car from a station and returns it to a different station.

c) **Two-way station-based or Round Trip**: the customer has to pick up the car from a station and returns it at the same station (e.g.: Zipcar).

In 2016, round-trip carsharing was the predominant type of carsharing operation globally. However, one-way carsharing has been growing, representing a 76% growth in worldwide membership and 23% in the worldwide vehicles fleet, between 2014 and 2016. A noteworthy point is the predominance of one-way carsharing (66.1% membership) over round-trip carsharing that only occurs in the European market (Shaheen *et al*., 2018).

According to Martinez *et al.* (2017) moreover one-way free floating carsharing systems are replacing round-trip systems, as it can be more flexible to users.

Carsharing tends to be more feasible in large cities, where there is a greater need for mobility and inherent problems such as lack of mobility options, traffic and limited parking. Many carsharing providers verify that, regardless of the city, there is a spatial distribution pattern of users of carsharing: live in densely populated quarters near the city center, with good accessibility to public transportation (U.S Department of Transportation, 2018). However, in these areas, sparse parking is usually the biggest mobility problem.

The emergence of carsharing has maximized mobility options in cities and has moderated social costs, by offering a choice between public transport and the private car in terms of convenience and costs (Clewlow, 2015). While the private car is quite convenient but it is a more expensive option, the opposite is true for public transports.

3.2.3. Carsharing market growth and potential

Carsharing started in Zurich, Switzerland in 1948, with a cooperative known as "Sefage". At that time, carsharing was advertised as a sustainable mobility service whose implementation would provide some relief for environmentally destructive air pollution (Momo Carsharing, 2009). However, the service only gained more popularity and started to grow by the mid-2000s in U.S., as a result of service maturity (Kodransky and Lewenstein, 2014) and also when social and environmental issues related to mobility began to gain more importance and public interest.

In 2016, B2C carsharing accounted for around 15 million members and 157,000 vehicles in 46 countries and approximately in 2,095 cities (Shaheen *et al*., 2018). Between 2014 and 2016, the carsharing market grew by 76% in terms of membership (Figure 1), as a result of the adhesion of more consumers in established markets and the expansion to new ones.

Figure 1 - Global Carsharing Market Trends- Members vs Vehicles

	2006	2008	2010	2012	2014	2016
Members	346,610	670,822	1,163,645	1,788,027	4,842,616	15,050,192
Compound Annual Member Growth Rate (2 yr)	0%	39%	32%	24%	65%	76%
Vehicles	11,501	19,403	31,967	43,554	104,125	157,416
Compound Annual Fleet Growth Rate (2 yr)	0%	30%	28%	17%	55%	23%
Member-Vehicle Ratio	30.1	34.6	36.4	41.1	46.5	95.6
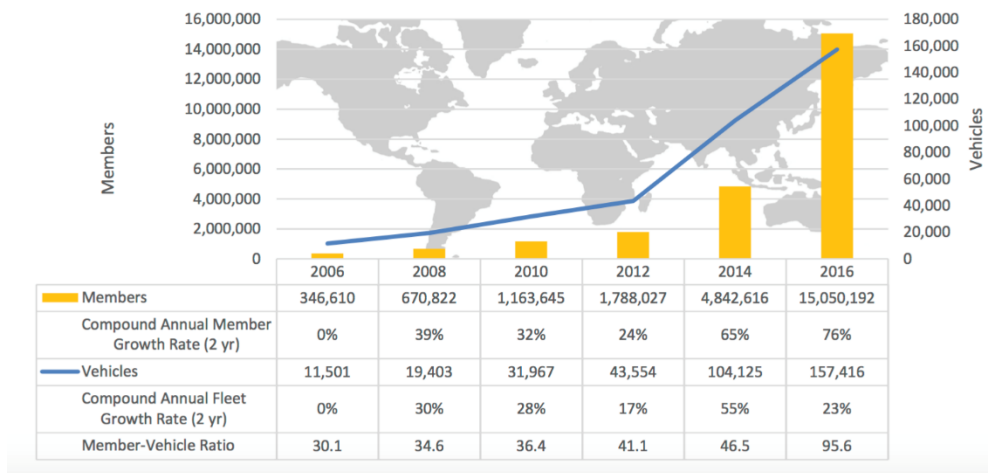
Source: Innovative Mobility: Carsharing Outlook, Shaheen et al., 2018

Europe is the second largest carsharing market in the world, by accounting for 29% of members and 37% of vehicles in the global market (Figure 2). Between 2014 and 2016, the European market grew significantly due to the increasing carsharing awareness.

In part, the fact that more consumers are receptive to services which require the use of mobile applications (Apps) have been contributing to this growth. Consumers are much more interactive, connected and participative and also much more aware of environmental issues.

Figure 2 - European Carsharing Market Trends- Members vs Vehicle

	2006	2008	2010	2012	2014	2016
Members	212,124	334,168	552,868	691,943	2,206,884	4,371,151
Compound Annual Member Growth Rate (2 yr)	0%	26%	29%	12%	79%	41%
Vehicles	7,491	10,833	16,779	20,464	57,947	57,857
Compound Annual Fleet Growth Rate (2 yr)	0%	20%	24%	10%	68%	0%
Member-Vehicle Ratio	28.3	30.8	32.9	33.8	38.1	75.6
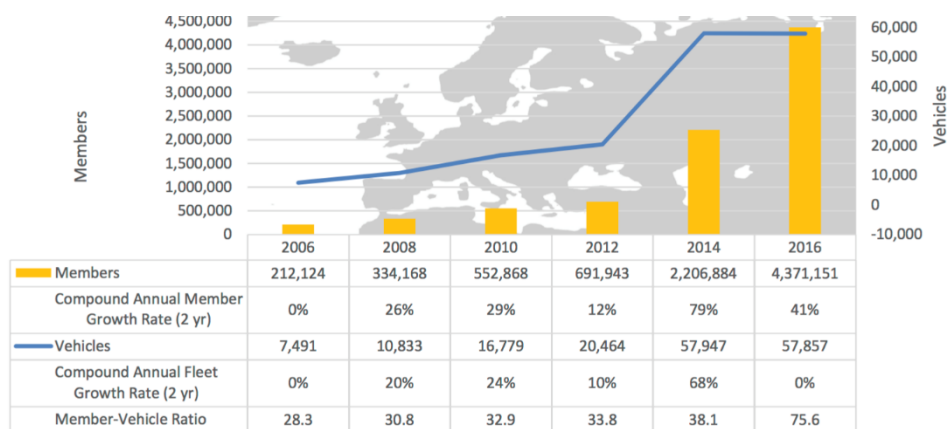
Source: Innovative Mobility: Carsharing Outlook, Shaheen et al., 2018

With more and more people opting for shared mobility systems and public transports, the number of car owners will decrease. According to the study "Five Trends

transforming the Automative Industry" conducted by Pwc (2018), in 2030, the cars stock will fall from the current 280 million to 200 million in Europe. In that same year, one in three miles driven will be shared.

At this stage of growth, barriers to carsharing are mostly the lack of regulation policies regarding carsharing (Shaheen and Cohen, 2008.; Lane *et al.*, 2015; Münzel *et al.*, 2017) and the little awareness about the service. Regulation policies and the recognition of carsharing by Governments greatly help the dissemination of this service as well as its optimization by companies. Consumer joining the services have also a lot to do with marketing and product design. Professor José Viegas (Mobility on The Move Conference, 2017) states that if these two tools are implemented effectively, people will certainly join these services. One should be aware that is imperative to explain all the service steps and the full potential of the service in order to overcome several barriers and convert more people into members. João Oliveira, Managing Director of Via Verde Carsharing in Portugal (2017) states that it is only through experimentation that consumers perceive how simple this transport model is.

3.2.4. Carsharing Impacts

Carsharing is a flexible mobility option with the potential to meet different individual mobility needs in a sustainable and socially beneficial way.

One of the major carsharing impacts is the reduction in private vehicle ownership, which helps to reduce vehicle emissions and energy consumption, traffic and parking congestion and encourages modal shift (Litman, 2000; Shaheen and Cohen, 2008; Martin and Shaheen 2011; Münzel *et al*, 2017). On the other hand, carsharing is a convenient option, which provides access to a vehicle to those who otherwise wouldn't have financial capabilities to use one. In addition, carsharing companies have arisen in several cities to create better efficiencies as having a car that is driven by only a driver for an hour or two a day and looking for limited and expensive parking spots vehicle while they work, shop, visit or consume entertainment.

Car ownership carries many costs. On one hand, fixed costs such as depreciation, financing, insurance, taxes and maintenance. On the other hand, variable costs as fuel, parking and, eventually, tolls. According to The Car Cost Index 2018 conducted by LeasePlan, the average cost of having a car in Europe is 616€ per month. According to the same report, depreciation is the highest cost of a private car, followed by Road Tax + VAT and Insurance and Accident Management, as shown in Figure 3.

Figure 3 - Average monthly split of ownership costs (all countries)
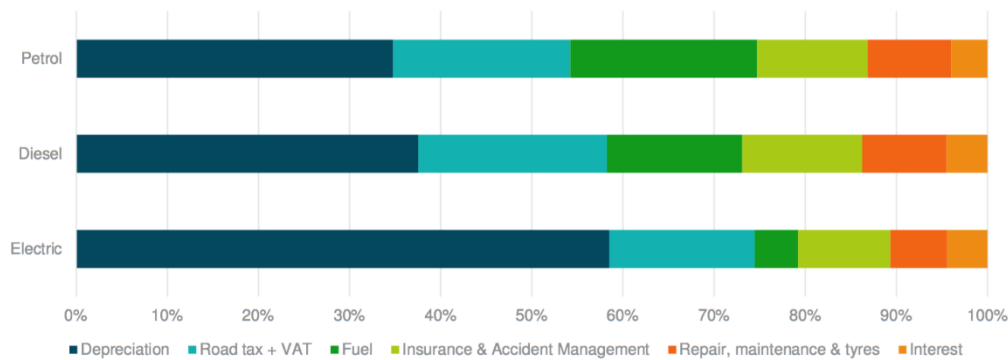
Source: The Car Cost Index 2018 by Lease Plan

Although variable costs are not so prevalent, in recent years, energy prices have become increasingly expensive and parking in urban centers is getting increasingly limited. When using carsharing, the user pays a membership fee (annual or single) and/or pays a fee for driving time or kilometers traveled. Thus, fixed costs inherent to private vehicle ownership are transformed into a variable cost based on kilometers or time.

In 1984, Thoreau addressed the concept of effective speed for the first time in his book Walden. Effective speed is a concept that adds travel time from a mode of transportation to the time spent working to pay the private and social cost of the trip. According to David Vale, in an interview with the Fumaça journalistic project (2018), in urban centers the average car speed is 40km/hour, the average bus speed is 20km/hour and the average bicycle speed is between 17km/hour and 18km/hour. The car is the transport that presents the lowest effective speed, because to walk at 40km/hour individuals will have to work harder to pay all the expenses of it. Then, one can conclude that is also the more expensive transport among the three examples given.

Recent studies show that carsharing members have significantly fewer vehicles than non-members and that their interest in buying a private vehicle decreases after participating in carsharing. In a study conducted by Shaheen and Cohen (2008) it was revealed that 15.6% to 31.5% participants sold a vehicle after joining a car sharing program and 23% to 26.2% avoided or delayed the purchase of a vehicle. A noteworthy point is that some carsharing members join the service because they do not own a vehicle, which influences these results (Clewlow 2015). However, interesting findings (Shaheen *et al.*, 2016) about the Zipcar carsharing company, shows that 34% of university students say that Zipcar gave them less desire to buy a car, compared to the 15% of those who

have more desire to buy a car.

For individuals who have a personal car and use carsharing, they are more likely to use the personal car for a selective and less regular use, which has an impact on driving kilometers. Even zero-vehicle carsharers increase their kilometers driven in the short term. However, they will drive less in the long term once they delay the purchase of a vehicle or do not even buy it (Cervero *et al*., 2007; Lane *et al.,* 2015). In this sense, there is a reduction in VMT among carsharing as a group. European studies indicate a large reduction in vehicle mileage by 28% to 45% (Shaheen and Cohen, 2008).

Carsharing also has an impact on congestion, traffic and parking places in cities. Recent studies have shown that carsharing reduces 4 to 10 cars in Europe (Shaheen and Cohen, 2008). Considering that most private cars are parked 95% of the life time and are used in rush hours, these results are found to contribute to a decrease in pressure and congestion (Momo carsharing, 2009; Shoup, 2011; Morency *et al.,* 2015).

For Peter Muheim (1998) carsharers learn to optimize their mobility by choosing the alternatives they have. Intermodality, which means, the combination of various modes of transport during a single trip also impacts the car ownership. Researchers have found that more sustainable transportation choices often require multiple modes of transport (bus, taxi, metro, carsharing, bike) in a single journey. By opting to use various transports (bus, bike, car sharing, train, etc.), individuals end up reducing kilometers traveled, which has an impact on CO_2 emissions (Litman, 2000; Momo Carsharing, 2009; Vancouver Credit Union, 2018)

Carsharing encourages the reduction of car ownership which by itself will impact on the cars production. One should note, that it's not just the cars in circulation that have a negative environmental impact. This situation begins well before the first kilometer. The process of building a car uses raw materials and energy, in which CO_2 emissions are also caused. Furthermore, carsharing also contributes to the decrease of miles traveled which results in less harmful air pollutants and less spent fuel. Although this question has been studied by several researchers, there is no definitive conclusion regarding a number of specific CO_2 reduction. In 2009, Momo Carsharing conducted a study with several European carsharing suppliers and found that emissions per kilometer of new cars (CO_2 emissions of 153.5 g/km) transcended 15.6% of CO_2 emissions from carsharing vehicles (CO_2 emissions of 129.6 g/km). In 2011, Martin and Shaheen estimated that each person could reduce 0.58 tons of CO_2, which is translated to 11%-16% of the average CO_2 emissions of each American household's transportation (Wang *et al.,* 2017). More

recently, in 2017, a study conducted by Martinez *et al.* based on individual interviews with carsharing users showed that, in the most likely scenario tested, carsharing has a potential to reduce CO_2 emissions by 83%. There is no a final conclusion about the reduction of CO_2 emissions, which may be related to different study contexts, as different regions and land-use.

Finally, carsharing has also beneficial social impacts. On one hand, people who did not have access to a vehicle can now have access to vehicles and to benefits such as convenience and cost savings (Vancouver Credit Union, 2018). Families can obtain or maintain vehicle access without bearing the total cost of ownership of cars (Shaheen and Cohen, 2008). On the other hand, carsharing is an additional service that increases and improves the mobility options available for individuals, which represents an additional value for the customer (Martinez *et al.,* 2017).

These benefits may be more significant in large urban centers, where carsharing is more feasible due to the large population concentration and where the costs of private car use are higher. These impacts make it possible for cities to be greener and to be a place where people have a range of sustainable mobility options to choose from. Obviously, it's not only carsharing that influences this change, it's required to achieve a modal shift among the population (Drápela, 2015). This is going to be a long-term change.

3.2.5. Consumer's perception about carsharing

Schuster *et al.,* (2015) indicate four determinants that may influence the choice of owning or sharing a vehicle: cost considerations, convenience of access, satisfaction with property, and environmental attitudes.

The order of reason's importance for using carsharing have been changing in the recent years. Environment attitudes are no longer the only driver to use carsharing as at the time the service was created in Switzerland. Costs considerations and convenience are also factors that influence the decision to share. Researchers are divided on whether consumers are more cost-oriented, convenience-oriented or more environmental-oriented when deciding to use carsharing.

According to David Vale (2018), a specialist in mobility and urban planning, there will always be people who are going to think about collective well-being and there will always be people who will think more about their individual comfort. In fact, (Bardhi and Eckhardt, 2012) have found that Zipcar's communication focuses heavily on sustainability, environmentalism and the sense of community while consumers use the

service because they want to reduce expenses and want a more convenient option of transport. People value carsharing for its convenience of having a car always available, without having the burden of vehicle maintenance and cleaning. They also value carsharing lower costs that enables them to save money to invest in other important areas of their lives (Bardhi and Eckhardt, 2012).

On one hand, some researchers refer that consumers choose carsharing as a cheaper alternative. Bardhi and Eckhardt (2012) found that economic reasons were dominant for Zipcar's members. On the other hand, researchers say that convenience is the key factor. In a Vancouver study (2018), most interviewees chose convenience as the deciding factor (95%). This indicator was transversal to demographic and geographic variables. According to Joo (2017), time savings and convenience are the main determinants for the use of carsharing. According to Carsharing Portland Data (2017), the distance to the nearest vehicle is one of the most important indicators of the use of shared cars (Wang *et al.,* 2017). This is closely linked with the ease of access to technology, which enables car owners to book their car through their smartphone and /or have a smart card that gives them access to cars (Degirmenci and Breitner, 2014). Lastly, the environment impact despite being seen as an attractive factor, is not the main one. This needs to be complemented with one of the other factors - convenience or price. Carsharing has appeared and grown as a service that contributes to the relief of air pollution (Nijland *et al.*, 2015; Firnkorn and Müller 2011), however, although people know and have this perception, they do not consider this factor enough to use the service.

When it comes to reasons to people not to use carsharing several appear to be determinants. According to Cornet, A. *et al*. (2012) in Germany, one of the largest carsharing markets, carsharing demonstrates low usage and conversion rates. The difference between those who are aware about carsharing and those who knows how it works is quite significant (Figure 4). In addition, there is also a significant difference between people who consider using carsharing and those who actually use it.

Figure 4 - Lowest conversion rate for people that are aware of carsharing and that actively consider using it

Source: Cornet, A at al., 2012
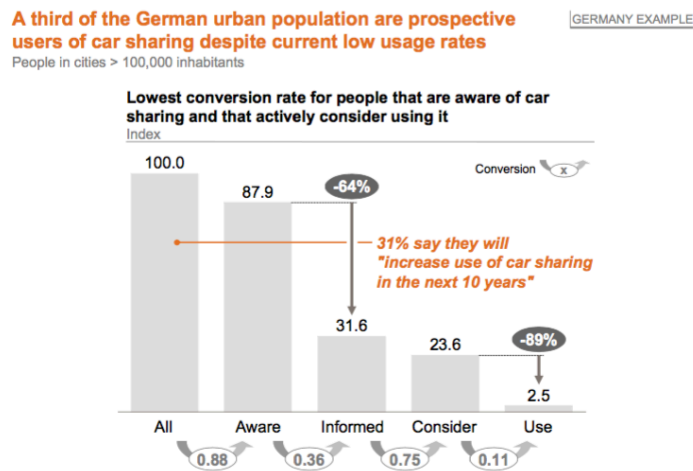
In a study conducted in China in 2017 (Wang *et al.,* 2017) it was found that participants who were informed about carsharing were willing to pay higher prices and give up buying a car. One can conclude that when people realize how carsharing works and its benefits they are more predisposed to use it. The point that has not yet been totally explained and have been little investigated is the gap that exists between the number of people who are informed and consider using the service and the people who actually use the service.

Emil Drápela (2015) found that the reasons why the participants in the study did not use carsharing was related to the car comfort, it inherent status and emotional meaning. The convenience and comfort of the private car are the main factors in choosing to own a vehicle instead of sharing. The author refers that financial issue has not been proved to be of major importance. Even so, recent studies indicate that non-members of carsharing who considered using the service do not use it due to high membership fees and to poor accessibility to shared vehicles (Litman, 2000; Namazu *et al.,* 2018).

3.2.6. Carsharing Users

Recent studies, conducted in Europe and U.S., have shown the profile of a typical carsharer: young adult, between 20 and 45 years old, predominantly males, higher-educated people (at least a bachelor), from middle or middle/upper income households, from zero-vehicle households, living in urban areas, single or families and heavy users of more sustainable ways of transport (Cervero , 2007; Martin and Shaheen, 2011; Bardhi

and Eckhardt, 2012; Vine, S. *et al*, 2014; Clewlow, 2015; Namazu *et al.*, 2018).

Young people are losing their interest in car ownership, as they do not see it as a symbol of status and success as previous generations. They are very receptive to new technology and shared-use solutions (U.S. Department of Transportation, 2018). This generation does not see the car as a symbol of status and success as previous generations, they see it as a transportation mean.

According to a study conducted by McKinsey & Company (2012) carsharers can be divided into three groups, according to their car ownership situation:

- Drivers without their own car;

- Drivers who want to sell your car;

- Drivers who use carsharing as a complement to their own car and existing mobility standards.

3.3.   Mobility in Portugal

The culture of the car that has developed in Portugal has been changing the structure of cities and mobility in large urban centers. By 2016, there were approximately 6 million drivers in Portugal (INE, 2016). In the same year, there were 4,850,229 passenger vehicles (3% more than the previous year) (INE, 2016) and of the 18.2 million trips made, more than 16.1 million were made by car (Shifter, 2018). Portugal is the only European country where the number of kilometers of motorways (11108 km) is greater than those of railways (2546 km). In this way, the culture that prevails in Portugal presents only one transport option and entails social and environmental problems. In 2010, the road transport sector in Portugal had 35% of the final energy consumption and approximately 30% of CO_2 emissions (Melo *et al.,* 2014).

All this happened in a context of strong urban expansion without any or with very little planning. The mobility of people was not thought of when new metropolises were born, as happened in the Lisbon Metropolitan Area (LMA), on the north or south riverside.

LMA encompasses 18 other municipalities and has 3,000 km^2 and 2.57 million inhabitants (INE, 2017). This is a polycentric area, which means that has several population centers (David Vale, 2017), residential or business zones.

According to the provisional results of the INE's Mobility Survey (2017), in the metropolitan area of Lisbon, the mobile population represents 80.4% of the resident population, with a total volume of 5.4 million trips per day. On average, one person makes

2.60 trips a day. These trips last on average 24.3 minutes for an average distance of 10.3km and the main reasons are "work", purchases and private affairs (INE, 2017).

A study carried out in 2014 indicates that at the peak times 60,000 cars, 400 buses and 2000 taxis circulate simultaneously (Martínez *et al.,* 2014), which means 60 vehicles per kilometer of road in Lisbon. The average car occupancy rate is 1.2 passengers, with public passenger occupancy being relatively low during the day with 13 passengers for bus with 80 seats (OECDE, 2015).

According to the study carried out by INE (2017), the majority of LMA's residents prefer the own vehicle (car and moto) as the main transport mean (57,3%), as it can be seen in Figure 5.

Figure 5 - Distribution of the number of journeys by means of transport on weekdays (LMA)
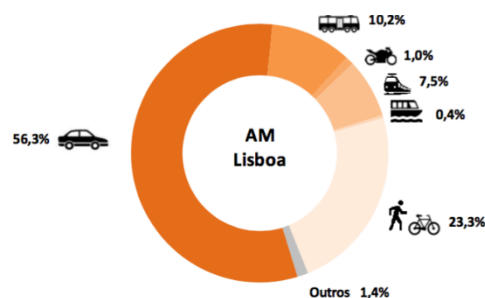
Source: INE, 2017

Most individuals opt for private transportation for reasons of "speed" and "comfort". On the other hand, individuals using public transport have "the absence of a mobility alternative" and report the price of public transport as the main reasons for choosing this option (INE, 2017). An interesting point to note is that the reasons as "public transport network without direct connection to the destination", "absence of a mobility alternative" and "public transport services without the necessary frequency or reliability" were also reasons that weighed in the decision of drivers to choose to move by car (INE, 2017). Apart from individuals perceive that they do not have many mobility alternatives, it is also perceived that the perception of the quality of public transport is not the best.

The intermodality between transports is a solution that many citizens are willing to adopt. Around 62% of Portuguese respondents said that digital services that provided information on carpooling and carsharing services near them would help them and facilitate their daily commutes and 44% are willing to use solutions such as carpool or

carsharing more often (European Mobility Observatory, 2017).

Simon Dixon, Deloitte partner and global transportation leader stated that "*Lisbon scores quite well on mobility*" (Mobi Lisbon Summit, 2018). However, for John Skowron, Deloitte Global Consulting Public Sector Leader, Lisbon's biggest disadvantage is the high weight of own cars in circulation, combined with low parking costs, heavy traffic congestion and high accident rate on access roads in comparison with other cities worldwide (Mobi Lisbon Summit, 2018). In fact, a study conducted by ACP Observatory in September 2018 indicates that there are 200 thousand parking spaces for 745 thousand cars that circulate in the city every day, which means four cars for each parking space (Observatório ACP, 2018).

The Portuguese government, as well as the Lisbon Council, have been developing some initiatives to decrease road pollution in cities and increase the demand and efficiency of public transport. In 2011, a restriction was imposed on the circulation of cars prior to the year 1996 and 2000 in the city center of Lisbon. In 2014, António Costa, Mayor of Lisbon at that time, stated that the Strategic Vision for Mobility in Lisbon was "*Reinvent the Lisbon transport system, ensuring that anyone can move in at least 2 alternative ways, from anywhere to anywhere, with freedom, security, comfort, speed, in a sustainable and energy efficient way, without depending on its own vehicle* "(Antonio Costa, 2014). One of the major projects in the city is the implementation of the Pedestrian Accessibility Plan, the redefinition of the Public Transport network and large interfaces, parking management (EMEL), electric mobility and creation of shared services. This strategy is then to promote intermodality and modal distribution more environmentally friendly, giving priority to public transport and non-motorized modes of transport in the central city area, traffic moderation in residential neighborhoods and a more rational use of the automobile.

In the first instance, cities should be thought for people and to be lived by them in a healthy way. In 2017, the Portuguese Environment Minister, João Pedro Matos Fernandes, stated that it was not possible to continue designing large urban centers by thinking about car dominance. The minister said: "*We have, once and for all, to realize that what we need is mobility services, not car services. (...) Electrical mobility is fundamental and if it is shared even better.* " (Jornal Observador, 2017). The focus on mobility services and electric mobility is at the center of future government plans.

Portuguese government wants people who more efficient and sustainable forms of mobility as carsharing to have some fiscal incentive like other business models. At the

end of 2017, the Portuguese Assistant Secretary of State for Environment, José Mendes said that government has been working to create a framework with the objective of "*separate carsharing from other forms of mobility, in particular with regard to rent-a-car*" (Mobility on The Move Conference, 2017).

Recently, the 2018 State Budget was approved and, as Antonio Costa had mentioned at the time of the initial proposal, will "*extend the deduction to the collection provided for in n° 3 of the article 78.°-F to the VAT incurred with the acquisition of mobility services in the form of sharing, such as bike sharing and car sharing, provided by entities with the appropriate CAE*" (Lusa, 2017).

3.3.1. Carsharing in Lisbon

In Portugal, carsharing is only present in Lisbon, in which is present since 2014. Lisbon which is a medium-sized city, with an area of 84.6 km^2 and 565 thousand inhabitants, and place in the center of Lisbon Metropolitan Area.

Carsharing has surged as an efficient and sustainable option for this city. In 2014, Melo *et al.* have done a study about the impacts of carsharing in Lisbon based on the activity of MobCarsharing, a mobility company. In 2014, one year after its beginning, there were 300 members (70% private users and 30% company users), representing only 0.05% of the city's population, partly due to the small coverage of the city with few vehicles. The authors found that Mobcarsharing showed a growing annual trend, both in total number of uses (average of 81% per year) and in total miles traveled, which increased on average 116% per year (MobCarsharing, 2013). The authors found that 12% of individual members used carsharing for purchases (excluding groceries) and 8% for medical appointments. The same study shows that carsharing has an impact on private car ownership. For 6 months prior to the study, 21% of participants started using other modes of transport and 8% gave up their private vehicle. In the near future, 21% intend to start using alternative transport and 4% mentioned a desire to stop having a private vehicle.

Recently, a study "A New Paradigm for Urban Mobility conducted by OECDE (2015 :9), have found that "*shared mobility services with a shared vehicle fleet could take more than 9 out of 10 cars off the streets of a mid-sized city like Lisbon*".

In 2018, carsharing membership is growing but is still not very expressive in Portugal when compared with other European countries. At the moment, there are three carsharing companies in Lisbon: 24/7 City, DriveNow and Emov. Users can book the car,

drive it throughout all national territory but will have to finish booking in any on-street parking or station within the service operation in Lisbon.

Hereinafter, the authors will explain in more detail the history and the operation of each company.

24/7 City

24/7 City, is a project resulting from a partnership between Hertz and a portuguese start-up, Mobiag. This carsharing platform offers a round trip carsharing service, as the user can only park the car in specific stations (Rua Castilho, Airport Humberto Delgado, Tagus Park, Lagoas Park and in Parque das Nações) without having an additional cost. Leaving the car in other areas has a cost of 10€.

Each car can be rented by the minute, hour or day. The price can oscillates between 0.29€/min. and 0.33€/min. In the first hour, the maximum a member can pay is 9.90€, which includes 30 km per hour, corresponding to the minimum billing period. For each extra block of three hours are charged more 5€. If the user stays more than ten hours with the car, it's charged the daily rate of 49€ (300 km included). Every extra kilometer has a cost of 0,20€.

Drive Now

Drive Now is a carsharing platform that is the result of a joint venture between BMW group and Sixt in 2011. The platform entered in Lisbon in 2017, in partnership with Brisa and with a free-floating carsharing operation. It offers 211 vehicles (BMW and Mini), of which 30 are electric (BMW i3). The prices oscillate between 0.29€/min and 0.31€/min, all-inclusive (parking, fuel or insurance). According to João Oliveira, Manager Director of Via Verde Carsharing in Portugal, the company plans to launch 9 and 24-hour packages this year, allowing the option of prepaid minutes, at cheaper prices (Economia Online, 2017).

By having an international operation, after registration, DriveNow members can use the services of the company in 13 other European cities where the company already has operation. At the moment of choosing a car, the user knows the car name ("Hi, my name is João!"), the level of the battery, the kilometers that the fuel allows to drive, the previous damages that the car suffered and if there are some special offer. All cars are equipped with Via Verde equipment, which allow the payment of fuel being made through the App when done at Galp (Brisa partner). Only the electric cars still need visa card given the mode of refuel of the MOBI.E. If the user needs to refuel the car, this expense is borne by the company and the client will receive free 20-minute bonus to make

up for lost time. Both on the App and on the website, members can see where the nearest loading and refueling stations are located. Whenever a customer needs to supply the car, it is enough to communicate this expense to the company, that the money is returned to him. As has been said, the supply is an expense that is already included in the price of the trip.

One should note that the company intend to have a 100% electric fleet in the near future. João Oliveira also states that the most difficult part of using the Drive Now platform on part of users is the registration, since it has to be done on the website and due to privacy concerns (Mobility on The Move Conference, 2017). At October 2017, the company already had more than 30 thousand registered users, of which 95% are Portuguese. According to João Oliveira, tourists do not have much impact on the business (Economia Online, 2017). On 12nd August 2018, the company reached 150 thousand trips. Sebastian Hofelich, Drive Now CEO, assume that the company's goal is for its clients to give up their own car.

EMOV

Emov was born in Madrid from the strategic alliance between Eysa and Free2Move, Groupe PSA's new mobility services brand. The platform entered in Lisbon in April 2018, with a carsharing free-floating service and placing 150 Citroën C-Zero on the streets.

This is the first carsharing service in Lisbon that bets heavily on sustainability and the environment by having a fleet composed entirely of electric vehicles. This company also bets on the price once it has entered the market with prices more competitive than other players (0.21€/min). As with all carsharing services, the price includes gasoline, parking and insurance.

The areas of operation of the last two mentioned companies- DriveNow and Emov, coincide (see **Appendix 1 and 2**): from Algés train station to Parque das Nações, through the 2nd Circular to Lumiar. The service also extends to Lisbon Airport. More recently, DriveNow expanded its service area to the Lagoas Park business park which has a good direct transport link with the Airport and vice versa.

3.4. Impact on Attitude toward using carsharing and Intention to use carsharing

Regarding the carsharing Portuguese market growth, it becomes important to understand what are the factors that most impact the perception of the Portuguese about carsharing and its intention to use the service.

In this chapter, the authors will address concepts such as attitude, past behavior and intention that will be the basis of the hypothesis model used in the study.

In recent years, the attitude-behavior relationship has been studied by many authors of social psychology field and has been the focus of many empirical studies. Several authors have found that there's a relationship between attitudes and behavior (Ajzen and Fishbein, 1977; Bagozzi, 1981; Ajzen and Timko, 1982; Fazio and Zanna, 1981; Kim and Hunter, 1993). The impact on attitude may depend on the nature of the experience, whether direct or indirect, and the behavior itself (Fazio and Zanna, 1981; Foxall, 2005). Some authors have also found that intentions are key mediators of this relation (Ajzen and Fishbein, 1977; Bagozzi, 1981).

According to Reasoned Action Theory (Ajzen and Fishbein, 1977), the best predictor of a behavior is intention, which is determined by the attitude towards the behavior and by subjective norms. This theory is based on the assumption that individuals behave under volitional control, as they consider the implications of their actions and can easily perform behaviors if they want to do so. Generally speaking, a person will attempt to behave if he believes will be succeeded, if he believes that important others think he should perform the behavior and if he has sufficient control over the situation.

3.4.1. Past Behavior

Several authors argue that past behavior is one of the best predictors of future behavior through attitudes, once it represents a summary of relevant experiences the individual has had so far (Fazio and Zanna 1981, Foxall 2005).

Following the baseline of Fazio, Powell and Williams' model (1989), we can say that attitudes are more likely to have an impact on behavior intention if they are inferred from past behavior, which can give more information and confidence to individuals about the behavior in question. Furthermore, if attitudes are formed through direct experience they are likely to be more predictive than the ones who are formed through indirect experiences, once the memory towards the behavior in question is more accessible.

One should take into account the following example: an individual heard of carsharing mobility option through a friend who has already tried and used regularly. Comparing the experiences of the first individual and his friend, one can say that the past experience of the second individual is much more valuable as a predictor than that of the first one. If the experience has been positive, the individual is much more likely to form a favorable attitude.

3.4.2. Attitude toward the behavior to use Carsharing

Attitude has been studied and conceptualized over the last years (**Table 1**).

Table 1- Definition of Attitude

Authors	Definition
Allport, 1935 :810	*"a mental and neural state of readiness, organized through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related"*
Doob, 1947 :136	*""attitude is an implicit response with drive strength which occurs within the individual as a reaction to stimulus patterns and· which affects subsequent overt responses"*
Campbell, 1950 :31	*"'an individual's social attitude is a syndrome of response consistency with regard to social objects"*
Fishbein and Ajzen, 1977 :889	*"person's attitude represents his evaluation of the entity in question."*
Petty and Cacioppo, 1981 :7	*"should be used to refer to general and enduring positive or negative feeling about some person, object, or issue"*
Fazio and Zanna, 1981 :162	*"an attitude is the evaluative feeling that is evoked by a given object. "*

Source: Own table

According to TRA, attitude towards behavior is defined by individual's positive or negative salient beliefs about the outcomes of certain behavior and the evaluation of that outcome (Fishbein and Ajzen, 1967). Thus, a person who holds positive beliefs about the outcome of attaining an action, will have a positive attitude towards a behavior and the other way around. Fishbein and Ajzen (1977) believe that attitude toward behavior is a better predictor of intentions than attitude toward objects or people. One should take into account that attitudes are not created by themselves, beliefs contribute to their formation. The more information a person has about a behavior, the more the person can consider and evaluate the possible outcomes (beliefs) and build an attitude towards that behavior (Fazio and Zanna, 1981).

3.4.3. Behaviour Intentions

According to Triandis, intentions are "*instructions people give to themselves to behave in certain ways*" (1980: 203). However, behavior intentions are not the actual performance of a behavior, but "*an intention to try performing certain behavior*" (Ajzen, 1985 :18). Baggozi and YI posits that intentions are the "*decision to initiate an action*" (Bagozzi and YI, 1988: 2)

One should note that not all intentions are carried out, some are rejected, while others undergo changes. As time goes by, the individual is available to receive new information that influences his attitude, which has an impact on his intentions. Several authors argue that if the individual has a well-formed and strong intention, the new information he is about to receive will have a small impact on the change of attitudes (Ajzen and Timko, 1982 Bagozzi and YI, 1989).

Generally speaking, the more favorable the attitude toward the behavior, stronger should be the individual's behavioral intention to perform a given behavior. Thus, authors pretend to know if attitude towards using carsharing are favorable and, in which degree they influence carsharing use intentions.

4. Research Framework

In recent years, carsharing has grown and has expanded to new markets. Consequently, this is a topic that has been the focus of much research. The perception and behavior of individuals regarding carsharing has been debated by several authors. Recent studies have found that people who do not use carsharing but have a favorable attitude toward using carsharing, consider to use the service but at the end they don't use it (Cornet, A. *et al*., 2012). In addition, several authors argue that the predominant factors to use the service among users are convenience, costs consideration and environmental impact (Schuster *et al*., 2005; Shaheen *et al*., 2016, Joo, 2017). The big question is which of these factors is the most prevalent.

To provide answers to this research issue, it is important to identify which drive or hinder people consider to use or not use carsharing. Given this, a framework was created including some hypotheses to answer these questions within the scope of the portuguese market. Hence, the main objectives of this study are to understand if people know how carsharing works and which impact it has on service adoption (1); to understand the main factors that drive carsharers to use the service (1), to understand if non-users consider

using the service (2), and if so what are the factors that influence that decision (3). Furthermore, the present study also serves to understand the mobility behavior of users and non-users. The authors want to know which type of transport people use, for what purposes and in which frequency. In this way, the authors can define a mobility profile for users and non-users.

This hypothesis model is based on the Theory of Reasoned Action (Ajzen and Fishbein, 1967) which refer that the best predictor of a behavior is intention, which is determined by the attitude towards the behavior and by subjective norms. However, the authors will only consider the attitude toward using carsharing as the only element that will influence the behavioral intentions for using carsharing. According to Theory of Reasoned Action (TRA), attitude towards behavior is defined by individual's beliefs about the outcomes of certain behavior and the evaluation of that outcomes (Fishbein and Ajzen, 1967), which, in this case, are considered as being convenience, environmental impact and costs considerations. Generally speaking, a person who holds positive beliefs about the outcome of attaining an action and a positive evaluation of the outcome, will have a positive attitude towards a behavior and the other way around. Then, the more favorable the attitude toward the behavior, stronger should be the individual's behavioral intention to perform certain behavior.

According to Fishbein and Ajzen (1977), the investigator who analyses a particular behavior must first analyze four elements inherent to the behavior: action performed; the target, to which the action is directed; and the context and time at the action occurs. The authors consider the four elements as being the use of carsharing (action), transport (target); the city of Lisbon (context) and in a period of 3 months (time).

In order to arrive at conclusive results, 9 hypotheses were formulated as guidelines for the analysis (Figure 6).

Figure 6 - Research Framework
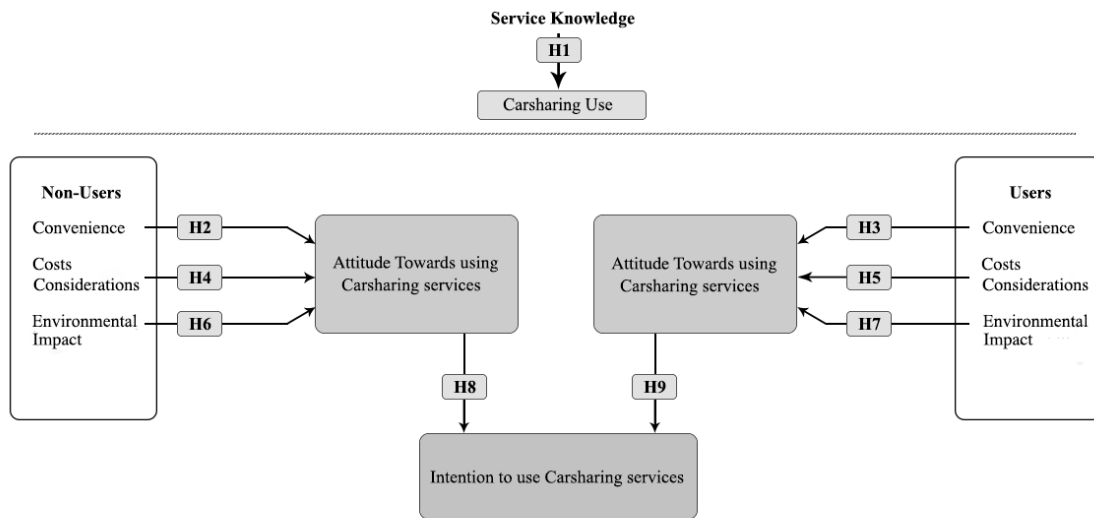
Source: Author's elaboration

Firstly, it's important to understand the level of knowledge participants have about the operation of carsharing system. Lack of information is one of the biggest barriers to carsharing adoption (Cornet, A. *et al.,* 2012), as it ultimately may lead to a lack of willingness to try the service. If an individual intends to use the service but does not know how it works this may be an impediment to use. Thus, the authors will first analyze the participants' level of knowledge and then, will cross with their past carsharing behavior.

H1: Knowledge about Carsharing service predicts Carsharing use.

When it comes to the factors that drive individuals to use carsharing, it's important to assess which ones have an impact on the attitude of consumers and non-consumers and which one is more prevalent.

For each factor, some variables are defined in order to assess the attitude towards the use of carsharing. For example, within the factor "Convenience" were defined variables such as travel time, availability, accessibility, among others. In this case, if the individual evaluates these variables as favorable results when choosing a means of transport and if he thinks that when using carsharing saves time, he has a car always available and is easy to access the vehicles, this means that the convenience factor positively impacts the attitude towards using carsharing.

The following hypothesis are related with the impact on the attitude towards using carsharing of the factors considered in this study- Convenience, Costs considerations and

Environmental impact.

Convenience *"is a reduction in the amount of consumer time and/or energy require to acquire, use, and dispose of a product or service relative to the time and energy required by other offerings in the product/service class."* (Brown and McEnally, 1993: 49). In 1986, Morganosky characterized convenience orientation as the consumer's desire *"to accomplish a task in the shortest time with the least expenditure of human energy"* (Brown and McEnally, 1993: 48).

Studies show that convenience is one of the main reasons why most people join carsharing and also the reason why people aren't giving up their cars. On one hand, it has been found that convenience is the key factor to decide to share a vehicle (Shaheen *et al.*, 2016), including variables such as car availability, distance to the nearest car, flexibility, variety of car types, comfort and free parking access (Vancouver Credit Union, 2018). On the other hand, studies say that non-members of carsharing, who consider using the service regularly show a degree of skepticism about the availability and accessibility to shared cars much more frequently than carsharing users (Lane *et al*., 2015). The accessibility and comfort of the private car is one of the main factors in choosing to own a vehicle instead of sharing (Drápela, 2015).

The authors will consider the variables Travel Time, Cars' Availability, Accessibility, Travel Needs, Comfort and Privacy as being part of the Convenience factor.

H2: Convenience has a positive impact on non-users' attitude toward using carsharing

H3: Convenience has a positive impact on users' attitude toward using carsharing

According to Schuster *et al.* (2005), the economic factor is the most important in the decision to use carsharing. Consumers find a service or product attractive when they perceive that the benefits of using it outweigh the costs (Dolan and Simon, 1996; Hennig-Thurau *et al*., 2007). Some authors found that carsharers choose carsharing as a cheaper alternative (Mont, 2004; Schuster *et al*, 2005). Notwithstanding, some other studies affirm that the high membership fees make consumers consider other alternatives to travel instead of using carsharing (Namazu *et al.,* 2018).

The authors will consider the variables Average Cost Per Trip and Costs Savings as being part of the Costs Considerations factor.

H4: Costs considerations has a positive impact non-users' attitude toward using carsharing

H5: Costs considerations has a positive impact on users' attitude toward using carsharing

Moreover, green, ethical and sustainable consumption are being more valorized by consumers and influencing their buying perception (Mobley *et al.,* 1995; Abdul-Muhmin, 2007). The consumption of raw materials (Botsman and Rogers, 2010; Walsh 2011) helps to reduce the negative impacts on environment, being seen as "environmentally friendly". Moreover, people are concerned about their individual environmental impact, which can be measured by their carbon footprint. As the greater their footprint, the greater the pollution each one causes individually.

In a study conducted in Vancouver, it was found that 6 out of 10 respondents use carsharing because are environmentally motivated (Vancouver Credit Union, 2018). The service main environmental benefit is the reduction of CO^2 emission derived from the decrease of cars circulation in the cities.

The authors will consider the variables Carbon Footprint Reduction and Traffic reduction as being part of the Environmental Impact factor.

H6: Environmental Impact has a positive impact on non-users' attitude toward using carsharing

H7: Environmental Impact has a positive impact on users' attitude toward using carsharing

Lastly, it's imperative to analyze if a favorable attitude towards carsharing leads to an intention to use it.

Intentions are a volition that transforms a mental evaluation about a behavior into a physical response (Ajzen and Fishbein, 1980). According to Bagozzi (1981), if an individual considers the advantages and disadvantages of performing a behavior (attitude), his intentions tend to be better formed and held with greater commitment.

The authors will analyze which of the two: users (with a direct past experience) or non-users (with an indirect past experience or without past experience) have a more positive attitude and which one have a more intention to use.

H8: Non-users' Attitude towards carsharing has a positive impact on their intention to use carsharing

H9: Users' attitude towards carsharing of users has a positive impact on their intention to use carsharing

All the hypotheses elaborated are summarized in the table below.

Table 2 - Research Hypothesis

Research Hypothesis
H1: Knowledge about carsharing service has a positive impact on carsharing use.
H2: Convenience has a positive impact on non-users' attitude towards using carsharing service
H3: Convenience has a positive impact on users' attitude towards using carsharing service
H4: Costs Considerations has a positive impact on non-users' attitude towards using carsharing service
H5: Costs Considerations has a positive impact on users' attitude towards using carsharing service
H6: Environmental Impact has a positive impact on non-users' attitude towards using carsharing service
H7: Environmental Impact has a positive impact on users' attitude towards using carsharing service
H8: Non-users' attitude towards using carsharing services has a positive impact on their intention toward using carsharing services
H9: Users' attitude towards using carsharing services has a positive impact on their intention toward using carsharing services

Source: Own table

5. Methodology

5.1. Research Design

This study was developed based on a quantitative descriptive research design.

According to Leedy (1993) quantitative descriptive research design is used to explain and predict a phenomenon, through the raising of questions about the relation of measurable variables. This method applies when is needed to answer to questions as "What?", "Why?" and "How?" and when the focus of interest is to understand "what is happening" and "why and how is happening" (Moscorola *et al.*, 2000). This type of study is initiated on the basis of hypotheses as a form of measurement and usually it ends with the confirmation or disconfirmation of the hypothesis tested (Moscorola *et al.*, 2000).

Since the main objective of this study is to understand the attitude regarding the use of carsharing and the intention to use the service in Portugal, this type of research proves to be the most adequate to explain this phenomenon.

The descriptive research can assume two formats regarding the number of moments or points in the time in which the data are collected: longitudinal, occurring over time to study an evolution or a change; or cross-sectional, occurred in a single moment. In this case, the study is descriptive cross-sectional since it is intended to describe and analyze the attitude and intent of a single non-repeated sample at a given time. The instrument used will be explained onward, in the Instrument Construction and Data Selection section of this study.

5.2.   Universe and Sample

For this study was considered "*all Portuguese who have driving license*" as the universe, since this is a mandatory condition to use carsharing. It's important that individuals are able to drive or have previously driven so that the attitude and intention to be tested are more realistic.

The sampling method used for this research was the non-probabilistic with convenience approach. A non-probabilistic sampling is obtained when the access to the information is not so simple or the resources are limited, so the researcher makes use of data that is most within his reach. In this process, individuals are selected for their availability and accessibility and not for a statistical criterion, as is the case of probabilistic sampling method.

As for the sample size, according to Fink (1995) corresponds to the number of respondents needed to obtain accurate and reliable results, as the larger the sample size the smaller the sampling error. In this case, a minimum goal of 300 responses was defined to ensure a significant number of responses of both consumers and non-consumers of carsharing. The final sample consisted of 300 individuals.

5.3.   Instrument Construction and Data Collection

The instrument chosen for data collection was an online questionnaire (**Appendix 3 and 4**) built at Qualtrics, an online platform for the construction of surveys.

Before the questionnaire was launched, a pre-test was carried out with 10 people of different ages and background to verify if the questionnaire was well constructed, if there were no errors and if any questions should be improved or withdrawn. Some issues have been reformulated, others have been removed and others have been added.

Attitude and intention to use carsharing in Portugal: users and non-users

At the launch of the questionnaire, it was distributed by digital platforms (Facebook, Messenger, WhatsApp, Instagram and Email) and none of the pre-test responses were considered for the final sample.

The questionnaire was written in Portuguese since it is the mother tongue of the studied sample. It contains closed and semi-closed answers, and filter and validation questions. Before starting the questionnaire, a brief introduction was presented to the respondents in order to contextualize them about the scope and purpose of the questionnaire. A filter question was asked ("Do you have a drive license?") so that the profile of the respondents corresponded as best as possible to the universe being analyzed.

The questionnaire was divided into four parts. The first part was developed with the aim of understanding the mobility habits of the respondents and also to understand which variables within the factors under analysis (convenience, costs considerations and environmental impact) they value more in the transport they use.

In a second part, the authors intend to know what type of knowledge respondents have about carsharing (if already have heard the concept and know how it works) and the respondents' past utilization regarding carsharing. It's in this phase that the respondents are divided into users or non-users of carsharing.

Regardless of respondents' level of utilization, for individuals who know well carsharing, a validation question was asked about the average price per minute of the service. For individuals who are not familiar with the service, a brief explanation of carsharing operation in Lisbon is given, including information about how it works to access carsharing fleet, and others as the average price per minute and the operating zone of the current companies. This explanation was presented to give enough information to respondents being able to answer further questions regarding attitude towards using carsharing. After this, respondents can consider the possible outcomes, evaluate them and build an attitude.

A third part analyzed the attitude towards the use of carsharing and the intention to use the service in the next three months. Taking into account the TRA (Fazio and Zanna, 1981), the attitude to the specific behavior is analyzed taking into account the evaluation of a certain outcome and the beliefs about the outcome of the given behavior. Thus, in the present study the determinants of convenience, costs considerations and environmental impact are considered as the outcomes. In the first part of the questionnaire the evaluation of the outcome was analyzed by asking to the respondents to evaluate the variables that considered the most important when choosing a transport. In the third part,

the beliefs about these same outcomes regarding carsharing are analyze in order to understand if the attitude toward using carsharing is positive or negative. As for the intention, a period of 3 months was defined. A short time has been chosen so that respondents' answers are more concrete.

Finally, respondents had to fill in their demographic data (gender, age, residence area, professional status, literacy and average monthly income of the household).

Concerning the constructs represented in the hypothesis model (Table 3): knowledge and use of carsharing; the beliefs about the outcomes of using carsharing (convenience, environmental impact and costs savings) as well as the attitude and intention to use carsharing, were analyzed using nominal scales, Likert scales with 5 points of scales and semantic differential scales.

One should note that all questions pertaining to items under analysis were presented equally to the two analysis groups: users and non-users.

Table 3 - Construct and Item Summary

Construct	Item
Carsharing Knowledge	**A1**. I already heard about it and I know well how it works **A2**. I already heard about it and I know more or less how it works **A3**. I already heard about it but I do not know how it works **A4**. I never heard about it and I do not know how it works
Carsharing Use	**B1.** I never used it **B2.** I used it once **B3.** I used frequently but stopped **B4.** I use sporadically **B5.** I use regularly **B6.** I use it every day
Convenience	**C1.** With Carsharing is/would be easy to book and access a car **C2.** With Carsharing I have/would always have a car available near me **C3.** With Carsharing I do not/would not waste much time reaching my destination **C4.** With Carsharing, I can/could choose the car that best meets my travel needs. **C5.** With Carsharing I have/would have privacy **C6.** With Carsharing I travel/would travel comfortably
Costs Considerations	**D1.** With Carsharing the average price of the trip is affordable **D2.** With Carsharing, I can/could save money.
Environmental Impact	**E1.** With Carsharing I reduce/ would reduce the size of my carbon footprint. **E2.** With Carsharing I contribute/I would contribute to the traffic reduction in the city
Attitude Towards Using Carsharing	**D1**. Carsharing is 1= Inconvenient/ 5= Convenient **D2**. Carsharing is 1= Expensive/ 5= Cheap **D3**. Carsharing is 1= Environment "Enemy"/ 5= Environemt Friend
Intention To Use Carsharing	**E1.** I intend to continue to use carsharing **E2.** I intend to stop using carsharing **E3.** I intend to try to use carsharing **E4.** I intend to return to use carsharinh **E4.** I do not intend to use carsharing

Source: Author's elaboration

6. Data Analysis and Results

6.1.   Sample Characterization

In this part of the sample characterization, the two subgroups of this study will be compared in demographic terms.

As mentioned previously, the research sample consists of 300 respondents. The authors will consider as users all those who respond "I use sporadically", "I use regularly" and "I use it every day" to the question "What is their relationship (as a driver) with carsharing?". Non-users are considered all those who answered "I never used it", "I used it once" and "I used frequently but stopped".

It is important to note that this question was mandatory and the whole sample is represented in this comparative analysis.

Figure 7 - What is your relationship (as a driver) with carsharing*?*
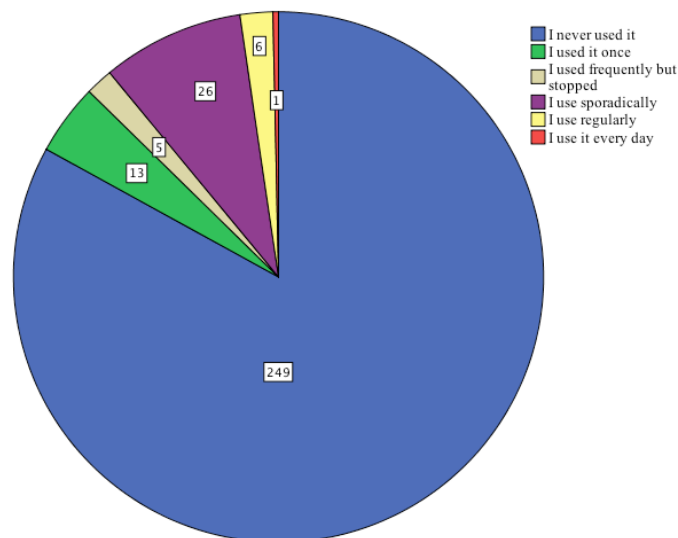
Source: SPSS

According to Figure 7, non-users represent the majority with 267 responses, and individuals who have never used have a great weight in this sub-group. As for non-users, these represent 33 responses, with the majority claiming to use the service sporadically.

Starting to make an analysis to the non-users it is noticed that the majority are women between the ages of 18 and 44 years. They are mostly workers or student workers with higher education and with a monthly household income between 1000 and 3000 euros, living mainly in urban areas as Lisbon and Almada. As for the users, it is verified that the majority are men (75.7%), aged between 18 and 44 years, workers (60.6%) with

higher education completed and a monthly income between 2000 and 3000 euros or more, living mainly in Lisbon and Almada (**Appendix 5**).

6.2. Mobility Behavior

In this chapter, it will be analyzed how users and non-users travel, which kind transportation they used the most, for what kind of reasons and which regularity. Hereinafter, the factors that individuals value the most when choosing a transport will also be analyzed.

Table 4 - Transports Most Used by Users and Non-Users

Transports	Users		Non-Users		Total
	N	% over total of Users	N	% over total of Non-users	N
Own vehicle	30	90%	236	88,3%	266
Metro	19	57%	125	46,8%	144
Bus	8	24,2%	69	25,8%	77
Train	9	27,2%	58	21,7%	67
Ferryboat	2	6%	14	5,2%	16
Bike	6	18%	14	5,2%	20
Carsharing/Bikesharing/Scootersharing (sharing options)	17	51,5%	10	3,7%	27
Táxi	6	18%	24	8,9%	30
Uber/Cabify	20	60,6%	52	19,4%	72
Walking	16	48,4%	95	35,5%	111
Others	3	9%	5	1,8%	8

Source: SPSS

According to Table 4, the most used transport is the own vehicle by both users and non-users and, being verified the dominance of private transport in the sample. However, there is a difference in the use of other transports.

In the case of users, they use more transports to move around, with the most used ones being their own vehicle (90%), Uber/Cabify (60.6%), metro (57%), Carsharing/ Bikesharing/Scootersharing (51.5%) and Walking (48.4%). These individuals prefer their own vehicle and walking to move around every day. Metro is a transport used between 4

to 5 days a week and both Uber/Cabify and sharing option are used less often (between 1 time per week to 2 to 3 times a week).

On the other hand, non-users use less transports, and the most used ones are their own vehicle (88.3%), metro (46.8%) and walking (35.5%). In this case, the sharing option only represents 3.7%. Like the users, these individuals prefer to move every day by walking and with their own vehicle, and the metro is more used between 4 to 5 days a week. Regarding sharing options, the minority of non-users use it between 2 to 3 times a week to 1 time per week.

As for the reasons why they move, it is verified that non-users prefer to use their own vehicle and the metro mostly for leisure, work and personal matters and walk for leisure, personal affairs and shopping. It is observed that these individuals use sharing options mostly for personal and leisure matters.

In the case of users, these ones use their own vehicle and Uber/Cabify mostly for leisure, personal affairs and to go shopping. Metro is the transportation they use most to go to work. It is observed that these individuals walk more and use sharing options mostly for leisure.

Regarding the factors that individuals value the most when choosing a mean of transportation, one can verify that for both groups they are almost the same. As mentioned earlier, the factors considered in the study are Convenience, Costs Considerations and Environmental Impact. Within these factors, the authors presented several variables (Table 5).

Table 5 - Factors and Variables

Factors	Convenience	Costs Considerations	Environmental Impact
Variables	- Time travel - Availability - Accessibility - Travel needs - Privacy - Comfort	- Average price per the trip - Costs savings	- Carbon Footprint reduction - Traffic reduction

Source: Authors

The scale used to classify the importance of each variable was the 5-points Likert scale, in which 1=Not important at all, 2= Of little importance, 3=Neutral, 4=Important and 5=Very Important. Since point 3 (Neutral) is neutral, the authors will not consider it

as positive in this analysis. In this sense, it will be taken into account that the variables are considered important when the average is higher than 3.5.

Having this said, for non-users the most important factors are travel time, accessibility, availability, travel needs, privacy, comfort and average price per trip, costs savings and carbon footprint dimension. Among these, the most important factor is availability. As for users, the most important factors are travel time, accessibility, availability, travel needs, privacy, comfort and average price per trip and costs savings. Among these, the most important factor is travel time (see **Appendix 5)**.

6.3. Hypothesis Tests

In this section, all the hypotheses defined in the literature review will be tested with the intention of being validated, considering that the main objective of this analysis is that each premise of each hypothesis is confirmed.

In this sense, it is important to explain how this chapter will be structured. There will be three sections. In a first section, the authors will test if knowledge about carsharing predicts utilization of the service through Chi-square Independent Test.

In a second section, the authors will test the hypotheses with the factors that are expected to have an impact on the attitude about using carsharing. This analysis will be done for both users and non-users through Independent Sample T-Test and One Sample T-Test.

In a third section, the impact of attitude toward using carsharing on intention to use the service will be analyzed, through One Sample T-Test.

6.3.1. Carsharing Knowledge and Carsharing Utilization

In a first section, it is going to be tested if there is an association between the carsharing knowledge and the carsharing Usage. The test used will be the independence test of the chi-square that allows to verify the independence between two variables of any type that are presented grouped in a contingency table. This test shall not be used if more than 20% of the frequencies expected under the assumption of independence are less than 5 or if any of them is equal to 0.

The null hypothesis is "The variables are independent". The objective is the rejection of null hypothesis in order to be proved that the variables are dependent and that the "knowledge" variable influences the variable "utilization".

Table 6 - Chi-Square Tests for Knowledge and Utilization variables

Chi-Square Tests			
	Value	**df**	**Asymptotic Significance (2-sided)**
Pearson Chi-Square	101,742[a]	3	,000
Likelihood Ratio	81,041	3	,000
Linear-by-Linear Association	58,469	1	,000
N of Valid Cases	300		
a. 1 cells (12,5%) have expected count less than 5. The minimum expected count is 2,53.			

Source: SPSS

As only 12.5% of the expected frequencies are less than 5, the test can be used. The p-value to be considered is 0.000, so the null hypothesis is rejected (Table 6). One can conclude that the carsharing use of individuals is influenced by the knowledge they have about carsharing.

Table 7 - Non-users' and users' levels of knowledge about carsharing

		Non-Users	Users	Total
Knowledge	I never heard about and I do not know how it works	23	0	23
	I already heard about it and I do not know how it works	80	0	80
	I already heard about it and I know more or less how it works	139	7	146
	I already heard about it and I know well how it works	25	26	51
	Total	267	33	300

Source: SPSS

By looking at the Table 7, it is possible to verify that the more information individuals have, there are more users and less non-users. Most users know very well how carsharing works and there are none who do not know how it works or have not heard about it before.

As for non-users, it is possible to verify that a minority knows well how carsharing works and the majority know more or less how it works.

Figure 8- Do you consider that the price per minute of carsharing is
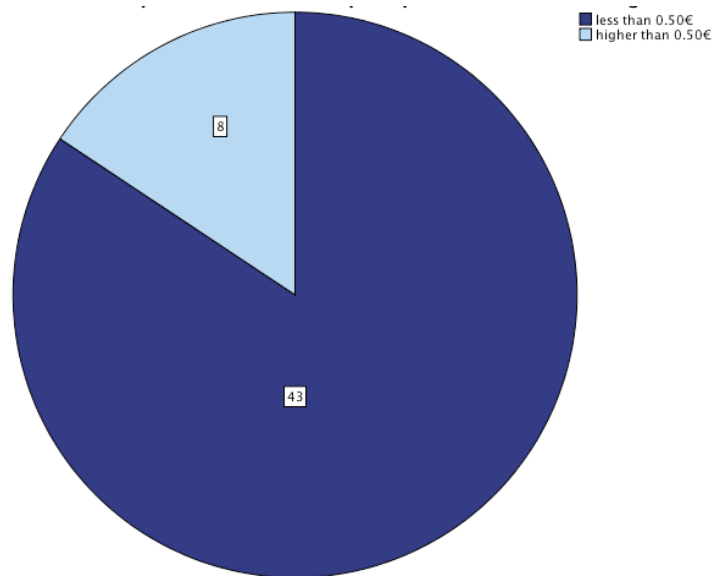
Source: SPSS

As shown in Figure 8, of the 51 respondents who have stated that know well how carsharing works, only 8 said that the price per minute of carsharing is higher than 0.50€.

One can conclude that knowledge about carsharing predicts carsharing use.

H1: Knowledge about carsharing service predicts carsharing use (Validated)

6.3.2. Factors Impact on Attitude towards using Carsharing

In the second section, the parametric Independent Samples Test was chosen to test the impact that each factor has on the user's and non-users' attitude to use carsharing. This test will measure the average equality for two samples, as it assumes that the null hypothesis (H0) states that the mean of each factor is the same for the two samples. If the null hypothesis is rejected, it is necessary to understand which group has a higher mean and whether it is positive or not.

Therefore, One-Sample Student's T-test will be used to test which of the variables of each factor have a more positive contribution in each factor. This test assumes that the null hypothesis (H0) is "the mean of the variable is equal to the test value". The test value defined must be positive (higher than 3.5) and sig. (2-tailed) should be below 0.05 assuming a 95% confidence level (Mooi and Sarstedt, 2011), so that H0 is not rejected and the variables are proved to be equal to t value. If the null hypothesis is rejected, the

larger and smaller limits of the confidence interval should be analyzed in order to see if the mean of the variable is greater or less than the test value.

Thus, in this section it will be tested the following hypothesis: **H2, H3, H4, H5, H6** and **H7**.

Table 8 - Independent Samples Test: Convenience factor for Users and Non-Users

		Levene's Test for Equality of Variances		T- test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval or Difference	
									Lower	Upper
Attitude-Convenience	Equal variances assumed	2,240	0,136	-3,506	298	0,001	-0,700	0,200	-1,094	,307
	Equal variances not assumed			-3,898	43,088	0,000	-0,700	0,180	-1,063	-0,338

Source: SPSS

Table 9 - Group Statistics- Independent Samples Test: Convenience factor for Users and Non-Users

Group Statistics					
		N	Mean	Std. Deviation	Std. Error Mean
Convenience-Attitude Towards Using Carsharing	Non-Users	267	3,63	1,097	0,067
	Users	33	4,33	0,957	0,167

Source: SPSS

Regarding the Convenience factor, this consists of six factors: Travel Time, Accessibility, Availability, Travel Needs, Privacy and Comfort.

The equality of means regarding the impact of Convenience factor on users' and non-users' attitude is going to be analyzed. But first, it is required to test the equality of variances through Levene's Test. As sig = 0,136 < 0,05, one can assume that the two samples come from populations with an equal variance. Thus, the test can be continued.

The null hypothesis is "the mean of convenience is the same for both users and non-users". As for T-test sig. = 0,001 > 0,05, the null hypothesis was rejected, so one can

verify that the mean of convenience is not the same for users and non-users. When looking at Table 9, it can be observed that users consider carsharing more convenient (mean=4.33) than non-users (mean=3.63). However, it must be borne in mind that both averages are above the defined value considered as positive, which is 3.5.

In addition, although both groups consider that carsharing is convenient, most users and non-users affirm that the transportation they use most regularly is more convenient than carsharing (see **Appendix 6**).

One can conclude that Convenience has a positive impact on users' and non-users' attitude towards using carsharing.

Table 10 - Student's T-test: Convenience variables for Non-Users

Convenience	Test value=3,5						
	Mean	t	df	Sig.(2-tailed)	Mean difference	95% Confidence Interval or Difference	
						Lower	Upper
Travel Time	3,24	-3,836	248	0,000	-0,259	-0,39	0,13
Accessibility	3,66	2,670	248	0,008	0,159	0,04	0,28
Availability	3,20	-4,661	248	0,000	-0,303	-0,43	-0,18
Travel needs	3,44	-0,866	248	0,387	-0,058	-0,19	0,07
Privacy	3,81	4,309	248	0,000	0,311	-0,17	0,45
Comfort	4,05	9,553	248	0,000	0,552	0,44	0,67

Source: SPSS

In table 10, one can see that the variables Accessibility, Privacy and Comfort are the ones which mean is higher than the test value. Although the sig. (2-tailed)> 0.05, the lower and upper ranges are positive.

All other variables assumed a sig. (2-tailed) > 0.05, however, their lower and upper limits of confidence intervals were negative, which means that there is statistical evidence that the its mean are below the test value.

Only the variable Travel Needs took a sig. (2-tailed) ≤ 0.05. However, it is possible to verify that the test value is negative (-0.866), as well as the mean difference (-0.058). Thus, there is statistical evidence that Travel Needs' mean is below the test value (3,44).

One can conclude that the variables Accessibility, Privacy and Comfort are the only ones that positively impact the convenience factor for non-users of carsharing.

H2: Convenience has a positive impact on non-users' attitude towards using carsharing (Validated)

Table 11 - Student's T-test: Convenience variables for Users

Convenience	Test value=3,5						
	Mean	t	df	Sig.(2-tailed)	Mean difference	95% Confidence Interval or Difference	
						Lower	Upper
Travel Time	3,49	-0,065	50	0,949	-0,10	-0,31	,030
Accessibility	3,94	2,955	50	0,005	0,441	0,14	0,74
Availability	3,29	-1,434	50	0,158	-0,206	-0,49	0,08
Travel needs	3,08	-2,550	50	0,014	-0,422	-0,75	-0,09
Privacy	3,75	1,423	50	0,161	0,245	-0,10	0,59
Comfort	4,18	5,185	50	0,000	0,676	0,41	0,94

Source: SPSS

In Table 11, one can see that only the variables Accessibility, Travel needs and Comfort assume a sig. (2-tailed) <0.05, which means that the mean of these variables is different from 3.5.

Of these three variables, Comfort and Accessibility variables have positive lower and upper confidence intervals, which means that the mean is greater than the test value. Regarding the variable Travel Needs the intervals are negative (-0.75; -0.09) which means that the average of this variable is well below the test value.

Regarding Privacy, given its sig > 0,05, which signify that the mean of these variables is equal to 3.5, this variable is considered as positively impact Convenience.

On the other hand, even though the sig. (2-tailed) <0.05, one can verify that Availability and Travel Time have a negative test value (-1,434 and -0,065, respectively). Looking at the mean of each variable, one can notice that both means are below the test value (Travel Time =3,49; Availability = 3,29).

One can conclude that the variables Accessibility, Privacy and Comfort are the only ones that positively impact the convenience factor for the users of carsharing, the same most valued by non-users.

H3: Convenience has a positive impact on users' attitude towards using carsharing (Validated)

Table 12 - Independent Samples Test: Costs Considerations factor for Users and Non-Users

		Levene's Test for Equality of Variances			df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval or Difference	
		F	Sig.	t					Lower	Upper
Attitude-Costs Considerations	Equal variances assumed	0,062	0,803	0,949	298	0,343	0,193	0,203	-0,207	0,592
	Equal variances not assumed			1,028	42,314	0,310	0,193	0,188	-0,186	0,571

Source: SPSS

Table 13 - Group Statistics- Independent Samples Test: Costs Considerations factor for Users and Non-Users

Group Statistics					
		N	Mean	Std. Deviation	Std. Error Mean
Costs Considerations- Attitude Towards Using Carsharing	Non-Users	267	3,04	1,111	0,068
	Users	33	2,85	1,004	0,175

Source: SPSS

Regarding the Costs Considerations factor, this consists of two factors: Average Price Per Trip and Costs Savings.

Through the Levene's Test, it was possible to notice that the two samples come from populations with an equal variance, since sig. = 0.803 > 0.05. Thus, it is possible to proceed with the test.

The null hypothesis is "the mean of costs considerations is the same for both users and non-users". The result of the Independent Samples Test was a sig. (2-tailed) equal to 0.343, which means that H0 is not rejected and the mean is found to be the same for the two groups.

When looking at the Table 13, one can notice that the means of each sample are very close. Users have an average of 2.85 and non-users an average of 3.04, being both below the neutral value that was defined (=3.5).

Furthermore, most users and non-users affirm that the transportation they use most regularly is cheaper than carsharing (see **Appendix 6**).

One can conclude that the factor Cost Considerations negatively impacts the users' and non-users' attitude towards using carsharing.

Table 14 - Student's T-test: Costs Considerations factor for Non-Users

Costs Considerations	Test value=3,5						
	Mean	t	df	Sig.(2-tailed)	Mean difference	95% Confidence Interval or Difference	
						Lower	Upper
Average Price per Trip	3,52	0,311	248	0,756	0,22	-0,12	0,16
Costs Savings	3,26	-3,336	248	0,001	-0,243	-0,39	-0,10

Source: SPSS

Among the two variables which form Cost Considerations factor, only Costs Savings variable have a sig. (2-tailed) <0.05, which signify that the mean is different from 3.5. As the lower and upper limits of confidence intervals are negative (-0.39, -0.10), it can be assumed that the mean of this variable is less than 3.5.

As for the variable Average Price Per Trip, the sig. (2-tailed) = 0.756 >0.05, which signify that the mean is equal to the test value, so one can conclude that non-users have a positive perception about this variable.

One can conclude that besides the positive perception about Average Price Per Trip, the negative perception about Costs Savings contributes to the H4 rejection.

H4: Costs Considerations has a positive impact on non-users' attitude towards using carsharing (Rejected)

Table 15 - Student's T-test: Cost Considerations variables for Users

Costs Considerations	Test value=3,5						
	Mean	t	df	Sig.(2-tailed)	Mean difference	95% Confidence Interval or Difference	
						Lower	Upper
Average Price per Trip	3,22	-1,875	50	0,67	-0,284	-0,59	0,02
Costs Savings	2,78	-4,567	50	0,000	-0,716	-1,03	-0,40

Source: SPSS

Regarding users, among the two variables which form Costs Considerations factor, only Costs Savings variable have a sig. (2-tailed) = 0.000 <0.05, which signify that the mean is different from 3.5. As the lower and upper limits of confidence intervals are negative (-1.03; -0.40), it can be assumed that the mean of this variable is less than 3.5. As for the variable Average Price Per Trip, one can say that besides its sig. (2-tailed) = 0.67 > 0.05, when looking at a mean difference, one can notice that this is still negatively significant.

One can conclude that both variables which form Costs Considerations factor are negatively evaluated by the users, which contributes to the H5 rejection.

H5: Costs Considerations has a positive impact on users' attitude towards using carsharing (Rejected)

Table 16 - Independent Samples Test: Environmental Impact factor for Users and Non-Users

| | | Levene's Test for Equality of Variances | | T- test for Equality of Means | | | | | 95% Confidence Interval or Difference | |
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Attitude-Environmental Impact	Equal variances assumed	0,190	0,663	-0,845	298	0,399	-0,180	0,213	-0,598	0,239
	Equal variances not assumed			-0,791	38,986	0,433	-0,180	0,227	-0,639	0,280

Source: SPSS

Table 17 - Group Statistics- Independent Samples Test: Environmental Impact factor for Users and Non-Users

Group Statistics					
		N	Mean	Std. Deviation	Std. Error Mean
Environmental Impact- Attitude Towards Using Carsharing	Non-Users	267	3,49	1,142	0,070
	Users	33	3,67	1,242	0,216

Source: SPSS

Regarding the Environment Impact factor, this consists of two factors: Carbon Footprint Dimension and Contribution to city traffic.

Through the Levene's test, it can be verified that the two samples come from populations with an equal variance of the variable, since sig. = 0.663>0.05. Thus, one can proceed with the T-test.

For this test, it's assumed that the null hypothesis is "the mean of environmental impact is the same for both users and non-users". The result of the Independent Sample Test was a sig. (2-tailed) = 0.399>0,05, which means that H0 is not rejected and the mean is found to be the same for the two groups.

When looking at Table 17, one can observe that the means of both sample are very close. Its shown that users have an average of 3.67 and non-users an average of 3.49. The average for non-users is below the value defined as neutral (3.5) and, in contrary, the average for users is above this same value.

Moreover, one should note that while the majority of users states that carsharing is more environmentally-friendly than the transportation they use the most, non-users states the opposite (see **Appendix 6**).

One can conclude that the Environmental Impact factor has a positive impact on users' attitude towards using carsharing, but it has a negative impact on non-users' attitude towards using carsharing.

Table 18 - Student's T-test: Environmental Impact for Non-Users

Environmental Impact	Test value=3,5						
	Mean	t	df	Sig.(2-tailed)	Mean difference	95% Confidence Interval or Difference	
						Lower	Upper
Carbon Footprint Dimension	3,39	-1,313	248	0,190	-0,106	-0,27	0,05
Contribution to city traffic	3,26	-2,829	248	0,005	-0,243	-0,41	-0,07

Source: SPSS

When it comes to non-users, both variables don't have a positive impact on Environmental Impact factor.

Carbon Footprint Dimension assume a mean equal to 3.5, as its sig. (2-tailed) = 0.190 >0.05. However, when looking to its mean difference (-0,106) and to its respective mean, one can conclude that it's well below the test value.

As for Contribution to city traffic, the mean is different from 3.5, as sig. (2-tailed) = 0.005<0.05. Looking at confidence intervals, one can observe that both lower and upper limits are negative, which indicate that the mean is below test value. One can verify that the mean of the variable is 3,26.

It is concluded that, the variables integrating the Environmental Impact factor are negatively evaluated by non-users, which contributes to H6 rejection.

H6: Environmental Impact has a positive impact on non-users' attitude towards using carsharing (Rejected)

Table 19 - Student's T-test: Environmental Impact for Users

Environmental Impact	Test value=3,5						
	Mean	t	df	Sig.(2-tailed)	Mean difference	95% Confidence Interval or Difference	
						Lower	Upper
Carbon Footprint Dimension	3,39	-0,608	50	0,546	-0,108	-0,46	0,25
Contribution to city traffic	3,35	-0,776	50	0,442	-0,147	-0,53	-0,23

Source: SPSS

Both Environmental Impact's variables assume a mean equal to 3.5, since the Carbon Footprint Dimension variable takes a sig. (2-tailed) = 0.546 > 0.05 and Contribution to city traffic takes a sig. (2-tailed) = 0.442 > 0.05.

Even though both variable's means are below the test value, the mean difference for each one are not considered as significant.

Thus, it's concluded that, the variables integrating the Environmental Impact factor are positively evaluated by users, which contributes to H7 validation.

H7: Environmental Impact has a positive impact on users' attitude towards using carsharing (Validated)

6.3.3. Attitude towards using carsharing and Intention to use

In the third section, the One Sample T-Test parametric test was chosen to measure the intention of users and non-users. This test assumes that the null hypothesis (H0) is "the mean of the variable is equal to the test value". The goal is the validation of null hypothesis so, the variables are proved to be equal to t value and positive.

Users had to choose whether they wanted to stop or continue to use carsharing, with options being 1=I intend to use carsharing and 2=I intend to continue to use carsharing. Non-users had to choose whether or not to use carsharing, with options being 1=I do not intend to use carsharing, 2=I intend to return to use carsharing and 3=I intend to use carsharing. Taking this into account, the authors defined a test value of 2, since from 2 the intention is positive in both cases.

After realizing if the mean intention is positive or negative for both groups, one must understand what factors influenced this decision. To do this, the authors will analyze the reasons why both samples were given to intend or not to use carsharing. In this part, cross tabs and graphs are used to figure out which answers are the most given.

Thus, in this section it will be tested the following hypothesis: **H8 and H9.**

Figure 9 - One Sample T-Test for Non-Users Intentions

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Non-Users Intentions	267	1,7603	,94721	,05797

One-Sample Test

Test Value = 2

	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference Lower	95% Confidence Interval of the Difference Upper
Non-Users Intentions	-4,135	266	,000	-,23970	-,3538	-,1256

Source: Spss

Previous findings of this study revealed that non-users' attitude towards using carsharing is positively impacted by the convenience factor. The two other factors have a negative impact on attitude. Therefore, it is critical to realize the intention that non-users have towards carsharing.

By analyzing the results of the One Sample Test, it is verified that the mean intention of non-users is different from 2 (test value), since sig. = 0.000 < 0.05. Observing

the lower and upper limits of the confidence interval, these are both negative, which means that there is statistical evidence to conclude that the mean intention of non-users is less than 2 and, therefore, is negative.

Before concluding that the attitude to use carsharing has a negative impact on the intention will analyze the reasons that non-users gave to not intend to use carsharing.

Table 20 - Group Statistics for Reasons why individuals do not intend to use carsharing

		It's not convenient for me	I consider the price high	I don't consider carsharing a transport environmentally-friendly	I need more information about the service	I don't like to drive	I don't need	I'm not interested	Other. Which one?
Statistics									
N	Valid	72	33	13	48	12	68	35	10

Source: SPSS

Table 21 - "Please state why you are not intending to use carsharing- Other. Which?"

Answers	Frequency
Indisponível na zona onde moro	1
Não é meu	1
Não existe na minha zona	1
Não frequento a zona onde o serviço existe	1
Não tenho telefone que seja possível ter a App	1
O carsharing poderá ser eficiente para quem vive em Lisboa, mas não para quem vive na margem sul.	1
Porque não abrange a minha área de deslocação	1
Prefiro transportes públicos	1
Privacidade	1
Utilizo um veículo de outrem para apoio à família idosos	1
Total	**10**

Source: SPSS

Although Convenience is the only factor that positively impacts the attitude, when looking at Table 20, it is verified that the reason "It's not convenient for me" is the reason most answered by non-users, followed by reasons as "I do not need " and" I need more information about the service". In addition, it should be noted that of the 10 individuals who answered "Other. What? ", 5 answered that in the area where they lived they did not have access to carsharing. More in depth, one of these respondents even specified that for those who live on the South side of Tagus River it is not convenient.

Attitude and intention to use carsharing in Portugal: users and non-users

Table 22 - Group Statistics for Reasons why non-users do intend to use Carsharing

		It's convenient for me	The price is a factor that attracts me	I consider carsharing a transport environmentally-friendly	I'm interested in trying	Other. Which one?
N	Valid	20	24	13	80	5

Source: SPSS

Table 23 - "Please state why you intend to use carsharing- Other. Which?- Non-users"

Answers	Frequency
Curiosidade	3
Turismo	1
Quero experimentar andar num Mini e puxar por ele porque não pago as manutenções nem possíveis avarias nem pneus	1

Source: SPSS

On the other hand, what causes non-users to intend to use carsharing is their curiosity and willingness to try the service (Table 22). There is a non-user who responds that he would very much like to try carsharing to have the experience of driving a MINI (Table 23).

One can settle that convenience is the main reason for both users who intend to use carsharing and those who won't, mainly due to lack of access. The authors bring to a conclusion that non-users' attitude towards using carsharing has a negative impact on intentions toward using carsharing services.

H8: Non-Users' attitude towards using carsharing services has a positive impact on intentions toward using carsharing (Rejected)

Figure 10 - One Sample T-Test for Users Intentions

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Users Intentions	33	1,9091	,29194	,05082

One-Sample Test

|	Test Value = 2				95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Users Intentions	−1,789	32	,083	−,09091	−,1944	,0126

Source: SPSS

Attitude and intention to use carsharing in Portugal: users and non-users

When it comes to user's attitude towards using carsharing, as concluded earlier it's positively impacted by the Convenience and Environmental Impact factors. The Costs Considerations factor has a negative impact on the attitude of users. Therefore, it is critical to realize the intention that the users have towards carsharing. By analyzing the results of the One Sample Test, it is verified that the mean users' intention is equal to 2 (test value), since the sig.=0.083 > 0.05.

By looking at Figure 10, it is verified that the mean is 1.90, that is below the test value but the author doesn't consider this difference as significant.

Thus, there is statistical evidence to conclude that the mean of the users' intention is positive. To support this decision, one can observe Figure 11, where it can be seen that of the 33 users of the questionnaire, only 3 answered that they intended to stop using carsharing.

Figure 11 - Users Intentions to use carsharing
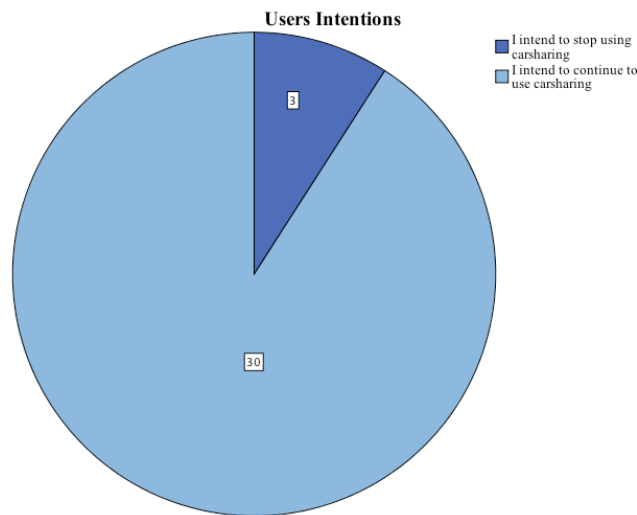
Source: Spss

Before concluding that the attitude to use carsharing has a negative impact on the intention, it is required the analysis of the reasons that the users gave to not intend to use carsharing.

Table 24 - Group Statistics for Reasons why users do not intend to use Carsharing

		It's not convenient for me	I consider the price high	I don't consider carsharing a transport environmentally-friendly	I need more information about the service	I don't like to drive	I don't need	I'm not interested	Other. Which one?
N	Valid	2	2	2	0	0	1	1	0

Source: SPSS

Although Convenience and Environmental Impact are the factors that impact the attitude of users in a positive way, they also become the reasons for users who do not intend to use carsharing, as can be seen in Table 24.

Table 25 - "Please state why you intend to use carsharing- Other. Which?- Users"

		It's convenient for me	The price is a factor that attracts me	I consider carsharing a transport environmentally-friendly	Other. Which one?
N	Valid	26	4	4	1

Source: SPSS

On the other hand, observing Table 25, it is verified that for the users who intend to continue to use carsharing, what influences more their choice is clearly convenience. The only respondent to "Other. Which one?" also touches on this point, by answering" Time optimization if a car is close to me ". This answer is related to the accessibility variable of the factor Convenience.

One can settle that convenience is the main reason for users intend to still using the service. The authors bring to a conclusion that users' attitude towards using carsharing has a positive impact on intentions toward using carsharing services.

H9: Users' attitude towards using Carsharing services has a positive impact on intentions toward using carsharing (Validated)

In order to conclude the hypothesis test, the following table (Table 26) intends to summarize the conclusions of all the tests made for each hypothesis.

Table 26 - Summary of Hypothesis Tests Results

Hypothesis	Tests	Conclusion
H1: Knowledge about Carsharing service predicts Carsharing use.	Independent Chi-Square Test	**Validated**
H2: Convenience has a positive impact on non-users' attitude towards using carsharing	One Sample T-Test and Independent Sample Test	**Validated**
H3: Convenience has a positive impact on users' attitude towards using carsharing		**Validated**
H4: Costs Considerations has a positive impact on non-users' attitude towards using carsharing		**Rejected**
H5: Costs Considerations has a positive impact on users' attitude towards using carsharing		**Rejected**
H6: Environmental Impact has a positive impact on non-users' attitude towards using carsharing		**Rejected**
H7: Environmental Impact has a positive impact on users' attitude towards using carsharing		**Validated**
H8: Non-users' attitude towards using carsharing services has a positive impact on their intentions toward using carsharing	One Sample T-test and Crosstabs	**Rejected**
H9: Users' attitude towards using carsharing services has a positive impact on their intentions toward using carsharing		**Validated**

Source: Authors' elaboration

7. Conclusions

7.1. Main Conclusions

This dissertation intends to understand the attitude and intention to use carsharing of two different groups: users and non-users. Since it is a very recent service in Portugal, it was intended to understand the reasons and barriers that can exist for the carsharing use.

Before analyzing the results of the hypothesis model, it is important to understand who are the individuals who answered the questionnaire, considering that they are divided into users and not users of carsharing.

The profile of carsharing user found through the questionnaire meets the profile that had been previously mentioned in the literature review: a young adult man between 25 and 34 years old, from middle/upper income, with higher education, worker and living in an urban area. Despite using his own vehicle as a first choice, tend to use various transports and combine their use. Regularly, it combines between his own vehicle and metro. Punctually, it uses a lot of services like Uber/Cabify and sharing services. It is an individual who is receptive to new services and is comfortable with the use of technology to move around. He uses carsharing as complement to other transportation means. On the other hand, the carsharing non-user reveals to be a woman between 18 and 34 years old, higher-educated, worker, from middle income, living in urban areas. It is a person who has her own vehicle as the first choice to move, and uses more 1 or 2 transports but less often. Regularly, walk more and use the metro. Does not use shared mobility services.

This study confirms the findings of the INE study (2017), most respondents prefer their own vehicle (car or motorbike) to move around on a day-to-day basis. There is no significant difference in vehicle ownership between users and non-users. This difference may be due mainly to the fact that the majority of users who answered the questionnaire use carsharing sporadically and are not carsharing heavy-users. As such, there is no decrease in users' own vehicle use, as mentioned in the literature (Shaheen and Cohen, 2008).

Furthermore, both individuals do not care much about the environment when it comes time to choose a mode of transportation to move around. What weighs most on the decision is the time they take to the destination, the availability of transportation and the transport that better fits the needs of each trip. On the other hand, both find it important

that the average trip price is affordable. However, the carsharing user is more concerned with saving on transport to invest in other activities than the non-user.

Preliminary evidence suggests that the lack of knowledge could influence the carsharing utilization, as individuals would not understand how the service works, what could be a barrier. In this study, it has been proven that the more information individuals have about carsharing, the more they use (H1 validation). Users are the ones who know most about carsharing, while the majority of non-users know what carsharing is but either do not know how it works or know more or less, which prevents them from using the service. One can verify that the lack of information is one reason some non-users do not intend to use carsharing.

Furthermore, some studies indicate that convenience and price can become the biggest reasons to use the service and also the biggest barriers. On the one hand, the price of carsharing includes car costs such as fuel, maintenance, cleaning, among others. However, the registration fee in the carsharing service is perceived as a high charge by individuals. On the other hand, carsharing is seen as a flexible and convenient service for most users. However, those who do not have access to the service because of the long distance to the nearest car, consider that the service is not convenient (Litman, 2000, Namazu *et al*., 2018). Regarding environmental impact, this is seen not as a major benefit that leads people to join carsharing, but rather as a complementary benefit.

The results of the study prove that convenience is the factor that most users and non-users attach importance to when they need transportation, followed by costs considerations. However, regarding attitude about using carsharing this is only positive for users, as non-users do not have a positive attitude towards using carsharing.

Thus, it translates into a negative intention to use the service by non-users. Non-users are no longer willing to use the service because they believe it is not convenient, mainly due to the lack of accessibility to the cars because they are not available in their area of residence, and claim that they do not need carsharing. It is noticed that the lack of information about the service, makes non-users do not realize the benefits of the service.

By knowing the service better, carsharing users have a positive attitude that is only positively impacted by the factor convenience and environmental impact. Although users intend to continue to use, they do not see this service as cheap, nor as an enabler of saving money to invest in other activities.

7.2. Academic and Marketing Implications

This study provides interesting and valuable results for academics and professionals in the areas of marketing and mobility industry.

The lack of information and studies on shared mobility services in Portugal is a fact. Few studies already have studied study the impact of carsharing in the city of Lisbon but not the perception that individuals have about the service. In this sense, this study has bridged this information gap.

This study provides valuable data regarding Portuguese mobility behavior to serve as a basis for future academic studies. Academics should take into account that there is still a great predominance of the use of own vehicle in Portugal. The paradigm of shared mobility has been growing a lot, but it does not make Portuguese people to give up their own car. In addition, there is a great lack of knowledge about this service.

Furthermore, as carsharing is a recent market that has been growing in the last two years, it is crucial to know what individuals think about the service. Companies that have been entering the market have valuable information since they already operate in other countries. This information gives them a general idea of what individuals are looking for in transportation and what they value in carsharing. However, each market has its own characteristics.

This study contributes to the development of the market by providing information about users and how these ones perceive carsharing, with the same happening for non-users. At a time of growth, it is important for companies to know who their potential customers are and how to communicate with them.

In this case, the potential customers are a young audience (18-35 years old), with a college degree, who uses their own vehicle a lot and few public transports. Although they find that carsharing is a convenient service, non-users attitude to using carsharing is not positive due to the price they believe to be expensive and the fact that they do not consider carsharing an environmentally friendly service. However, while they find that carsharing is a convenient service, they have no intention of using carsharing because it is not convenient for them. That is, while service is good but does not adapt to their mobility needs.

7.3. Limitations

Like any other, this study has its own limitations. In this case, the authors point out two.

First, the fact that carsharing is a fairly recent service makes the user sample small so that the results are not significantly conclusive. The non-probabilistic sampling method with a convenience approach may cause the results and findings not to be representative of the chosen universe. By not being selected for a statistical criterion, the proportion of sample was the 89% non-users and 11% users, which may be representative of the reality of use but is not enough to have significant conclusions. Furthermore, the majority of non-users are women between the ages of 18 and 25 does not make it representative of the population in general.

In second place, even though a pre-test was carried and afterwards some questions were improved and withdraw, there are still some questions to improve or include. On one hand, although it makes sense and have contributed to the results of the study, the construction of some questions in the questionnaire did not contemplate the tests that would be carried out to test hypotheses. Questions regarding knowledge about carsharing, degree of use and intention to use should have been constructed taking into account a Likert scale and not a single choice, in order to be measurable and easy to test. One the other hand, would be important if questions has number of cars in household and family size have been added, in order to better complement literature findings.

7.4. Future Research

The authors consider that in future studies homogeneity should be considered in the sample, as the proportion of users and non-users should be 50:50.

Furthermore, investigators should apply the same study but with a mixed approach methodology and use two types of methodologies, qualitative approach and quantitative approach, in different research phases and combine the results in order to improve accuracy. The qualitative approach could be a focus group with Portuguese shared mobility experts in Portugal and then a survey with users and non-users. It would also be interesting to test the intention and past a period to realize whether or not those same people have used the service and perceive the reasons.

It would also be interesting to a future research, study the attitude and intentions of peer to peer carsharing platforms. In this research, it was studied B2C carsharing,

however, P2P carsharing is also a strand that is growing around the world and could be valuable understand the potential that it could have in Portuguese market.

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Appendix 1- DriveNow Operation Area in Lisbon
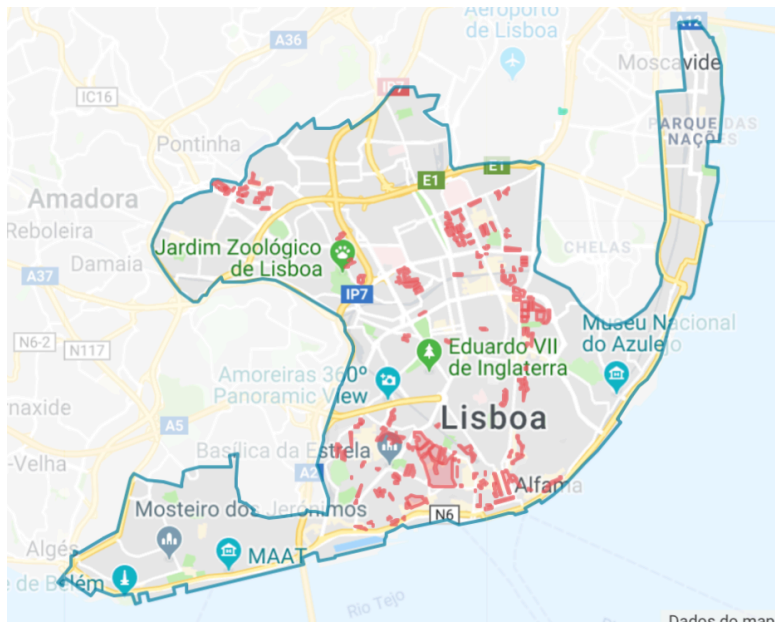
Source: DriveNow Website

Appendix 2- Emov Operation Area in Lisbon

Source: Emov Website

Appendix 3- Research Questionnaire (Portuguese version)

Pergunta Filtro: Tem carta de condução?

Sim (continua)

Não (acaba o questionário)

1. **Qual/Quais o(s) meio(s) de transporte que utiliza para se movimentar?**

Veículo próprio

Autocarro

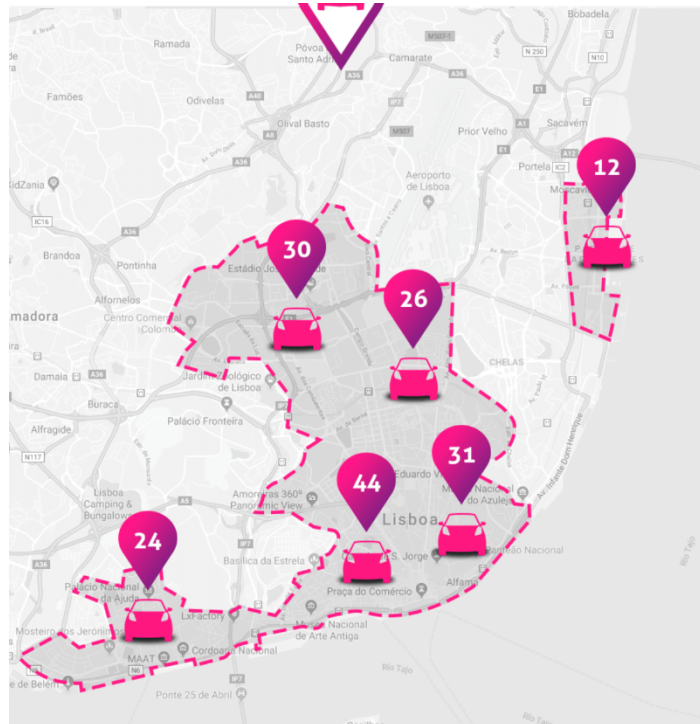Metro

Comboio

Barco

Bicicleta

A pé

Táxi

Uber/ Cabify

Ridesharing/ Carsharing/ Scooter sharing

Outro. Qual?

(passa para a pergunta 2)

2. **Indique as razões pelas quais utiliza os seguintes meios de transporte (escolha múltipla)**

	Trabalho	Universi-dade	Compras	Lazer	Assuntos Pessoais	Acompanha-mento familiar	Outra activi-dade
Opção 1							
Opção 2							
...							

(passa para a pergunta 3)

3. **Indique a frequência com que utiliza os seguintes meios de transporte. (escolha múltipla)**

	Todos os dias	4 a 5 vezes por semana	2 a 3 vezes por semana	1 vez por semana	Menos de 1 vez por semana
Opção 1					
Opção 2					
...					

(passa para a pergunta 4)

4. Classifique de 1 a 5 a importância os seguintes fatores quanto à escolha de um transporte.

	Nada importante	Pouco Importante	Indiferente	Importante	Muito importante
O tempo que demoro até ao meu destino					
Ter um transporte sempre disponível e fácil de aceder					
Ter um transporte que se adeque às necessidades de cada viagem					
Privacidade					
Conforto					
Preço médio da viagem					
Conseguir poupar no meio de transporte para investir noutras atividades					
A dimensão da minha pegada de carbono se utilizar um certo transporte.					
A contribuição para o trânsito na cidade desse transporte					

(passa para a pergunta 5)

5. Qual o seu grau de conhecimento sobre carsharing e o seu funcionamento?

Já ouvi falar e sei muito bem como funciona (*passa para a pergunta 6*)
Já ouvi falar e sei mais ou menos como funciona *(passa para a pergunta 7 e depois para a explicação sobre carsharing)*
Já ouvi falar mas não sei como funciona *(passa para a pergunta 7 e depois para a explicação sobre carsharing)*
Nunca ouvi falar nem sei como funciona *(passa para a pergunta 7 e depois para a explicação sobre carsharing)*

6. *Pergunta de validação.* *"Considera que o preço por minuto do carsharing é:*
Inferior a 0.50€/minuto
Superior a 0.50€/minuto

(passa para a pergunta 7 e depois para pergunta 8)

7. Qual a sua relação de utilização como condutor com o carsharing?

Nunca utilizei *(passa para a pergunta 9)*
Utilizei uma vez *(passa para a pergunta 9)*
Utilizava com frequência, mas deixei de utilizar *(passa para a pergunta 9)*
Utilizo esporadicamente *(passa para a pergunta 8)*
Utilizo regularmente *(passa para a pergunta 8)*
Utilizo todos os dias *(passa para a pergunta 8)*

O carsharing é o aluguer de carros ao minuto. Cada viagem custa em média 0.27€/minuto (inclui gasolina e estacionamento).
Para iniciar viagem, o utilizador tem de reservar o carro através da App. Após conduzir, tem de o deixar na zona atualmente abrangida pelo serviço: zona Lisboa, incluindo o aeroporto.

8. Classifique o seu grau de concordância com as seguintes afirmações relativamente ao serviço Carsharing.

Com o Carsharing...	Discordo Totalmente	Discordo em parte	Não concordo/nem discordo	Concordo em parte	Concordo totalmente
...é fácil reservar e aceder a um carro					
... tenho sempre um carro disponível para utilizar perto de mim					
...não perco muito tempo a chegar ao meu destino					
...posso escolher o carro que melhor satisfaz as minhas necessidades de viagem					
...tenho privacidade					
... viajo de forma confortável					
...consigo poupar dinheiro					
… reduzo a dimensão da minha pegada de carbono					
...contribuo para a redução de trafego na cidade					

(passa para a pergunta 10)

9. Agora que sabe como funciona o carsharing, imagine que tem a oportunidade de utilizar o serviço. Classifique as seguintes afirmações face à expectativa que tem do serviço.

Com o Carsharing...	Discordo Totalmente	Discordo em parte	Não concordo nem discordo	Concordo em parte	Concordo totalmente
...vai ser fácil aceder a um carro					
... vou ter sempre um carro disponível perto de mim					
...não vou perder muito tempo a chegar ao meu destino					
...vou poder escolher o carro que melhor satisfaz as minhas necessidades de viagem					
...terei privacidade					
... vou viajar de forma confortável					
... o preço médio da viagem é acessível					
...vou conseguir poupar dinheiro					
… vou reduzir a dimensão da minha pegada de carbono					
...vou contribuir para a redução de trafego na cidade					

(passa para a pergunta 10)

10. Classifique o carsharing segundo a proximidade do serviço aos seguintes pares de adjectivos.

Para si, o carsharing é..
Inconveniente_ _ _ _ _ _ _ Conveniente
Caro _ _ _ _ _ _ _ Barato
"Inimigo do ambiente" _ _ _ _ _ _ _ "Amigo do ambiente"

(passa para a pergunta 11)

11.   Classifique de 1 a 5 o grau de concordância com as seguintes afirmações, relativamente ao serviço Carsharing.

O Carsharing é...	Discordo Totalmente	Discordo em parte	Não concordo nem discordo	Concordo em parte	Concordo totalmente
...mais conveniente que os transportes que utilizo mais regularmente					
... mais barato que os transportes que utilizo mais regularmente					
... mais "amigo do ambiente" que os transportes que utilizo mais regularmente					

(passa para a pergunta 12)

12. Indique a opção que melhor reflete as suas intenções para utilizar carsharing nos próximos três meses:

      Tenciono continuar a utilizar carsharing (*passa para a pergunta 14*)
      Tenciono parar de utilizar carsharing (*passa para a pergunta 13*)
          (para utilizadores)
      Tenciono experimentar carsharing (*passa para a pergunta 14*)
      Tenciono voltar a utilizar carsharing (*passa para a pergunta 14*)
      Tenciono não utilizar carsharing (*passa para a pergunta 13*)
          (para não-utilizadores)

13. Indique as principais razões por que não considera utilizar carsharing nos próximos três meses:

      Não me é conveniente.
      Considero o preço elevado.
      Não considero que seja uma opção amiga do ambiente
      Tenho de me informar melhor
      Não gosto de conduzir
      Não preciso
      Não tenho interesse
      Outro. Qual?

14. Indique as principais razões por que considera utilizar carsharing nos próximos três meses:

      É um serviço que é conveniente para me movimentar.
      O preço atrai-me.
      Considero que é uma opção mais amiga do ambiente
      Outro. Qual?

DADOS PESSOAIS

Idade:
      18-24
      25-34
      35-44
      45-54
      55-64

Género:
      Feminino
      Masculino

Situação Profissional:
      Trabalhador
      Estudante
      Trabalhador-Estudante
      Desempregado
      Aposentado/Reformado
      Outro. Qual?_____

Habilitações Literárias:
      Ensino primário
      Ensino básico
      Ensino secundário
      Ensino professional
      Ensino superior (licenciatura, mestrado, etc.)
      Outro. Qual?_____

Zona de Residência (municipios da Area Metropolitana de Lisboa):
      Alcochete
      Almada
      Amadora
      Barreiro
      Cascais
      Lisboa
      Loures
      Mafra
      Moita
      Montijo
      Odivelas
      Oeiras
      Palmela
      Seixal
      Sesimbra
      Setúbal
      Sintra

Vila Franca de Xira
Outro. Qual?_____

Rendimento médio mensal do agregado familiar

Menos de 500€
500€ - 1000€
1000€ - 2000€
2000€ - 3000€
Mais de 3000€

Appendix 4- Research Questionnaire (English version)

Pergunta Filtro: Do you have a car license?

Yes (proceed)
No (finish the questionnaire)

2. **Which mean(s) transportation(s) do you use to move around?**

Own vehicle
Bus
Metro
Train
Ferryboat
Bike
Walking
Táxi
Uber/ Cabify
Ridesharing/ Carsharing/ Scooter sharing
Other. Which one? _____

(skip to question no.2)

3. **State the reasons why you use the following means of transportation (multiple choice)**

	Work	University	Shopping	Leisure	Personal Matters	Family Accompaniment	Other activity
Option 1							
Option 2							
...							

(skip to question no. 3)

4. Indicate how often you use the following means of transport (multiple choice)

	Every day	Between 4 to 5 times a week	Between twice to 3 times a week	Once a week	Less than once a week
Option 1					
Option 2					
...					

(skip to question no.4)

5. Classify the following factors regarding the choice of a mean of transport.

	Not important at all	Off little importance	Neutral	Important	Very important
The time it takes to reach my destination					
Having a transport always available near me					
Having a transport that fits my travel needs					
Privacy					
Comfort					
Average Price per Trip					
To save money on transportation to invest in other activities					
The size of my carbon footprint if I use a certain transport					
The contribution to traffic in the city of a given transport					

(skip to question no. 5)

6. What is your degree of knowledge about carsharing and how it works?
- a. I already heard about it and I know very well how it works (*skip to question no.7*)
- b. I already heard about it and I know more or less how it works *(skip to question no.8 and then to carsharing explanation)*
- c. I already heard about it but I do not know how it works *(skip to question no.8 and then to carsharing explanation)*
- d. I never heard about it and I do not know how it works *(skip to question no.8 and then to carsharing explanation)*

7. ***Validation question:*** Do you consider that the price per minute of carsharing is:

        Less than 0.50€/minute

        Higher than 0.50€/minute

8. **What is your relationship as a driver with carsharing?**

        I never used it *(skip to question no.10)*

        I used it once *(skip to question no.10)*

        I used frequently but stopped *(skip to question no.10)*

        I use it sporadically *(skip to question no.9)*

        I use it regularly *(skip to question no.9)*

        I use it every day *(skip to question no.9)*

Carsharing is car rental service to the minute. Each trip costs on average 0.27 €/minute (includes fuel and parking).
To start the trip, the user must book the car through the App. After driving, the user must leave it in the area currently covered by the service: Lisbon area, including the airport.

9. **Classify your degree of agreement with the following statements regarding carsharing.**

With carsharing…	Totally disagree	Disagree in part	Neither disagree nor agree	Agree in part	Totally agree
...is easy to book and access a car					
... I have always have a car available near me					
...I do not waste much time reaching my destination					
...I can choose the car that best meets my travel needs					
...I have privacy					
... I travel comfortably					
...the average price of the trip is affordable					
...I can save money					
… I reduce the size of my carbon footprint					
...I contribute to the traffic reduction in the city					

(skip to question no.11)

10. Now that you know how carsharing works, imagine that you have the opportunity to use the service. Classify the following statements regarding your expectation about the service.

With carsharing...	Totally disagree	Disagree in part	Neither disagree nor agree	Agree in part	Totally agree
...would be easy to book and access a car					
... I would always have a car available near me					
...I would not waste much time reaching my destination					
...I could choose the car that best meets my travel needs					
...I would have privacy					
... I would travel comfortably					
...the average price of the trip is affordable					
...I could save money					
… I would reduce the size of my carbon footprint					
...I would contribute to the traffic reduction in the city					

(skip to question no.11)

11. Classify carsharing according the proximity of the service according to the following pairs of adjectives

For you, carsharing is...
Inconvenient_ _ _ _ _ _ _ Convenient
Expensive _ _ _ _ _ _ _ Cheap
"Environmentally unfriendly" _ _ _ _ _ _ _ "Environmentally friendly"
(skip to question no.12)

12. Classify the degree of agreement with the following statements regarding carsharing.

Carsharing is...	1-Totally disagree	2-Disagree in part	3- Neither disagree nor agree	4- Agree in part	5- Totally agree
...more convenient than the transport I use the most					
...cheaper than the transport I use the most					
...more environmentally friendly than the transport I use the most					

(skip to question no.13)

13. Indicate the option that best reflects your intentions to use carsharing in the next three months:

       I intend to continue to use carsharing (*skip to question no. 15*)
       I intend to stop using carsharing (*skip to question no. 14*)
          (for users)
       I intend to try carsharing (*skip to question no. 15*)
       I intend to return to use carsharing (*skip to question no. 15*)
       I do not intend to use carsharing (*skip to question no. 14*)
          (for non-users)

14. State the main reasons why you do not consider using carsharing in the next three months:

       It's not convenient for me.
       I consider the price high.
       I do not consider it environmentally friendly.
       I have to get more information about it.
       I don't like to drive.
       I don't need it.
       I'm not interested.
       Other. Which one?

15. State the main reasons why you consider using carsharing in the next three months:

       It's convenient.
       The price is a factor that attracts me.
       I consider carsharing a transport environmentally-friendly
       Other. Which one?

DADOS PESSOAIS

Age:
> 18-24
> 25-34
> 35-44
> 45-54
> 55-64

Gender:
> Female
> Male

Professional Situation:
> Worker
> Student
> Working student
> Unemployed
> Retired
> Other. Which one?

Education:
> Primary education
> Elementary education
> High school
> Vocational Education
> Higher education (bachelor, master)
> Outro. Qual?_____

Residence Area:
> Alcochete
> Almada
> Amadora
> Barreiro
> Cascais
> Lisboa
> Loures
> Mafra
> Moita
> Montijo
> Odivelas
> Oeiras
> Palmela
> Seixal
> Sesimbra
> Setúbal
> Sintra
> Vila Franca de Xira

Other. Which one?

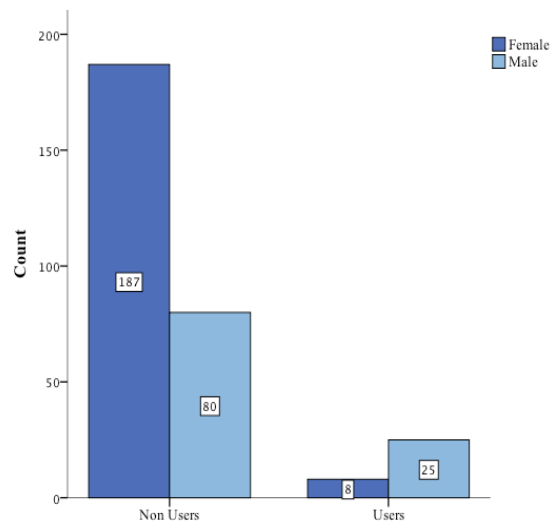**Average monthly household income**
Less than 500€
500€ - 1000€
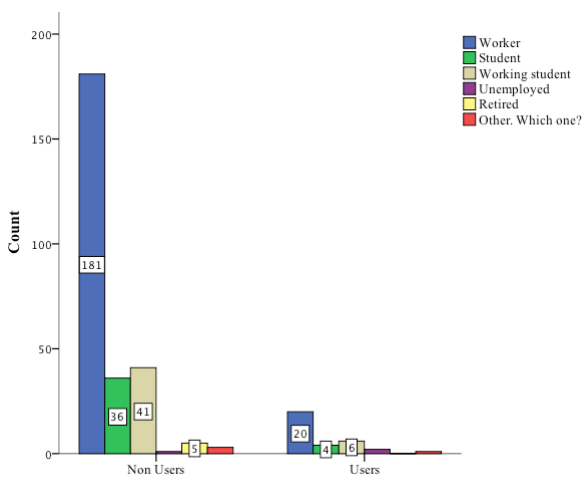1.000€ - 2000€
2.000€ - 3000€
More than 3000€

Appendix 4- Users' and Non-users' Demographics Illustrations
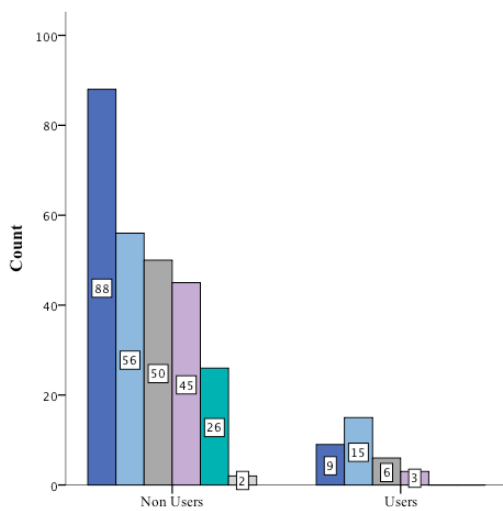
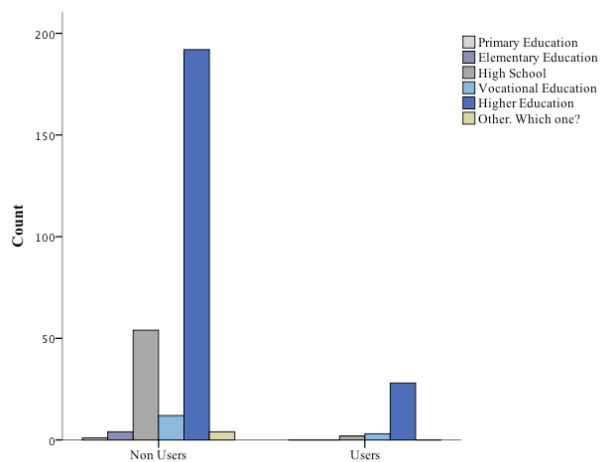**Age of Non-Users and Users**

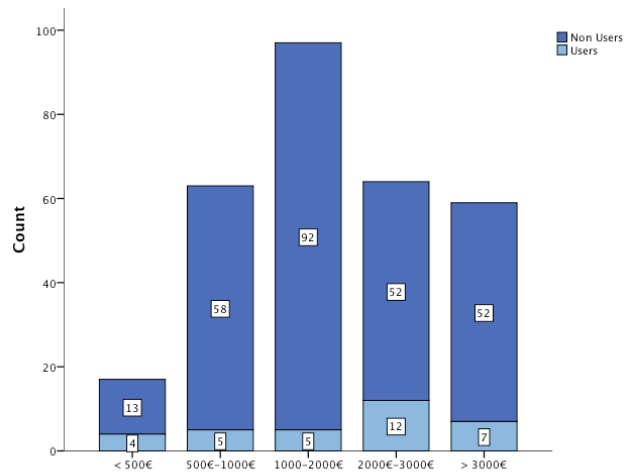**Gender of Non-Users and Users**

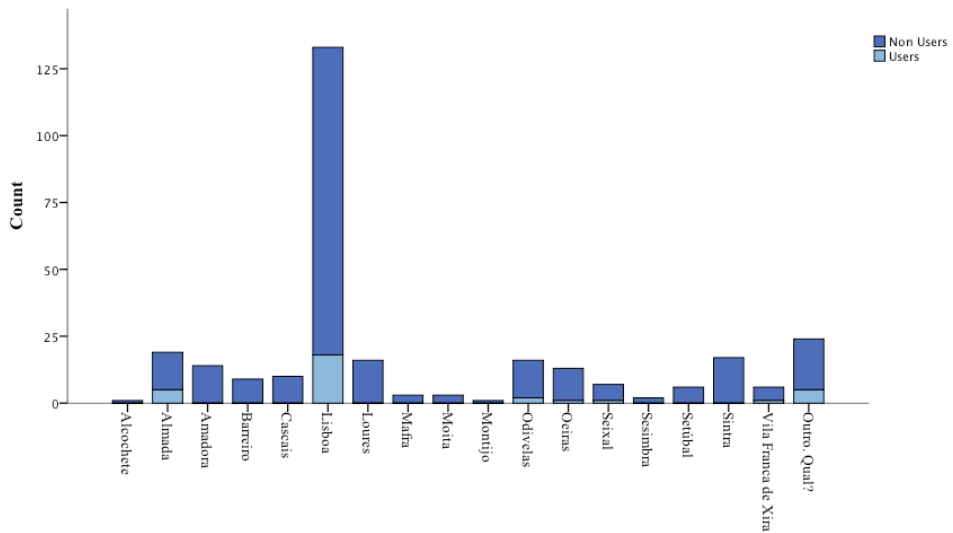
Professional Situation of Non-Users and Users

Education of Non-Users and Users

Attitude and intention to use carsharing in Portugal: users and non-users

Average Household Monthly Income of Non-Users and Users

Residence Area of Non-Users and Users

Appendix 5- Variables individuals value the most when choosing a mean of transportation

	Travel Time	Accessi-bility	Availa-bility	Travel Needs	Pri-vacy	Com-fort	Average Price Per Trip	Costs Savings	Carbon Footprint Dimension	Traffic Reductio n
Non-Users	4,58	4,19	4,63	4,40	3,70	4,04	4,33	3,99	3,56	3,48
Users	4,48	4,09	4,45	4,27	3,58	4,12	4,33	4,30	3,18	3,27
Total		4,57	4,18	4,61	4,38	3,68	4,05	4,33	4,03	3,52

Mean of the importance of each variable when choosing a mean of transportation

Appendix 6- Carsharing comparing with other transports

Carsharing is more convenient than the transport I use the most						
	Totally Disagree	Disagree in part	Neither disagree nor agree	Agree in part	Totally Agree	Total
Non-Users	60	74	57	64	12	267
Users	7	8	6	9	3	33
Total	67	82	63	73	15	300

Carsharing convenience comparing with other transports

Carsharing is cheaper than the transport I use the most						
	Totally Disagree	Disagree in part	Neither disagree nor agree	Agree in part	Totally Agree	Total
Non-Users	62	53	74	63	15	267
Users	10	8	11	4	0	33
Total	72	61	85	67	15	300

Carsharing costs considerations comparing with other transports

Carsharing is more environmentally-friendly than the transport I use the most						
	Totally Disagree	Disagree in part	Neither disagree nor agree	Agree in part	Totally Agree	Total
Non-Users	51	49	70	63	34	267
Users	4	5	12	9	3	33
Total	55	54	82	72	37	300

Carsharing environmental impact comparing with other transports