

Louvain School of Management

Consumer adoption of the functional economy in the mobility sector:

Focus on car-sharing in Brussels

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Executive summary

Mobility is one of the major challenges in urban areas. Whether in terms of environmental impact, with its contribution to climate change or poor air quality, or in terms of traffic flow with congestion or parking problems. In any case, it seems necessary to change the current mobility model which is still very much centred around the individual car, a model which is particularly inefficient in terms of resource use. The functional economy could be an answer to these problems by proposing a model no longer based on possession but rather on use.

However, such a change in mobility requires consumers to radically change their behaviour and adopt a new mobility model. It is therefore essential to understand whether the consumer would be willing to move from private car-based mobility to a more functional and diversified mobility and how to motivate them to do so.

It is in this context that we studied the case of Brussels consumers to understand: How can carsharing become a driver for consumer adoption of the functional economy in the mobility sector by the Brussels population?

Through in-depth one-to-one discussions with individuals with different types of profiles, we were able to gain insights into consumers' perceptions of mobility and their expectations and needs. Our research question was answered in two steps. First, by explaining the role that car-sharing can play in the substitution of the private car by a more functional mobility. Secondly, by understanding and discussing the main decision factors, barriers and motivations to the different means of transport, including the car-sharing, after which we were then able to make some recommendations for improving its adoption.

The conclusion of this work is that car-sharing can act as a driver for the adoption of the functional economy in the mobility sector, by substituting the personal car or at least by decreasing the number of personal cars per household, being used only when expressly needed for some limited situations. However, to do that, car-sharing has to be fully attractive, which is not yet the reality, since too many barriers, psychological and practical, and too few motivations are perceived by the consumers. The need for an efficient ecosystem in the mobility sector is, therefore, necessary to be able to reduce the barriers and foster adoption.

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List of abbreviations

AB consumption: Access-based consumption

AB-PSS: Access-based product-service system

B2C: Business-to-consumer

BCR: Brussels-Capital Region

GDP: Gross domestic product

LEZ: Low emission zone

MaaS: Mobility as a Service

P2P: Peer-to-peer

PSS: Product-service system

U-PSS: Use-oriented product-service system

INTRODUCTION

“We've always been told that having a car is freedom... What if the real freedom was to get rid of it?” (Bruxelles Environnement, 2022)

The private car has long been a symbol of freedom. The road is wide open in front of us and we can go anywhere. Owning a car would give a sense of choice, control and freedom. These are still often the arguments used by car brands. But is this still the case?

In today's reality, the widespread culture of the individual car has led to issues such as traffic jams and parking problems, especially in urban areas. In Brussels, journeys are on average 38% longer due to traffic jams. At peak times, this can rise to over 80%. (VIAS institute, 2022) The sharp increase in fuel costs has also limited the freedom to travel by car. The B10 diesel, for example, has risen from an average of 1.56€/L in 2021 to 1.99€/L in 2022 (Statbel, 2022b) For many private individuals, the price increase in 2022 forces them to be cautious about the number of trips they can afford. To this, we can add all the costs of maintenance and mandatory appointments. These are all factors that can undermine the sense of freedom.

Beyond individual issues, there are also societal issues. Mobility sector impacts the environment in many ways. It contributes to climate change, air quality, quality of life of citizens, destruction of the ecosystem, use of resources...

First of all, in terms of its contribution to climate change, the road sector in the Brussels region accounts for 27% of greenhouse gas emissions. In recent years, the European Union has been keen to move towards a low-carbon society. Given the significant environmental impact of mobility, it seems imperative to radically change it. The Brussels government has also set targets for reducing greenhouse gas emissions, such as a 30% reduction compared to 1990, to be achieved by 2025. (Bruxelles Mobilité, 2019; Bruxelles mobilité 2021a)

Mobility also leads to poor air quality due to the emission of air pollutants. In Brussels, air pollution is estimated to cause 600 deaths per year. Poor air quality is especially characteristic of a congested urban environment. In Brussels, road transport, mainly diesel, is responsible for around 70% of regional nitrogen oxide emissions. (Bruxelles Mobilité, 2019; Bruxelles mobilité 2021a)

The citizens' quality of life is also impacted by noise pollution produced by the mobility sector. In addition to being a nuisance to the quality of daily life, noise pollution also has an impact on health, for example by reducing the quality of sleep.

Land artificialisation is another problem that is harmful to the environment and the ecosystem. It is a consequence of the construction of roads which leads, among other things, to the waterproofing of the soil.

Another challenge today is resource optimisation. Whether for reasons of material cost inflation or the ecological impact of resource use, it is necessary to rethink our mobility to optimise resources. While there are nearly 6 million private cars in Belgium, most of them remain parked more than 90% of the time (Statbel, 2022a). This mobility model centred around individual cars is therefore really inefficient. Each car produced requires a certain amount of production energy, the so-called grey energy. Producing cars that are only used for about 2 hours a day is therefore particularly inefficient in terms of resource consumption.

Mobility is therefore a challenge that needs to be addressed promptly. It is imperative to find a balance that ensures the retention of good travel conditions and the well-being of citizens while reducing the environmental impact of mobility.

As developed above, mobility is one of the major challenges in urban areas today. The direction that the Brussels Region seems to be taking with recent reforms (e.g., the Good Move 2020-2030 plan) leads to predominantly functional mobility. A mobility proposition that, according to the principle of functional economy, would provide an integrated solution of several business models offering access to a good or a service rather than the good itself (e.g., public transport, shared cars or bikes, carpooling, taxis, ...). An exclusively functional mobility would therefore be a mobility model without possession where the use of each good would be optimised. *“Good Move aims to offer users a range of integrated services, which replace the need to own a personal car, and which promote the combination of modes of travel and public transport networks.”* (Bruxelles mobilité, 2021b, p.14)

Functional economy is one of the suggestions to oppose the traditional linear model of consumption and therefore to propose a solution to environmental issues. Rethinking mobility to make it more functional is probably a positive development in terms of sustainability, but the consumer should not be forgotten in the process. Indeed, the consumer is at the heart of the change. This new mobility proposal must be able to reduce the environmental impact, without

stopping to meet the needs and expectations of consumers. Beyond that, it must be able to attract and convince consumers to make the necessary changes in their habits to adopt it.

Context

Year after year, in order to bring potential added value to their offer, companies have tended over time to move away from product-centred business models and towards more service-centred and product-service integrated solutions. Belgium is currently mainly a service economy. Almost 70% of its GDP, gross domestic product, comes from the service sector while the share of industry reaches only 14%. (Waeyaert, 2020)

In addition to this shift towards a service economy occurring for several years, there has also been a growing concern in recent years about environmental issues. Consumers' attitudes towards their consumption have changed in recent years, paying more and more attention to societal and ecological consequences. This shift in the attitude towards sustainable consumption shows a growing concern of consumers and develops new sustainable consumption markets. Therefore, the emergence of the importance of sustainability is pushing business managers to explore new ways in the value-creation process (Annareli, Battistella, and al., 2019).

Both lead to a favourable context for the functional economy. Companies have the opportunity to change towards new business models focused on the usage of a product rather than on the product itself.

Research question

This thesis aims to understand how to motivate a change in consumer behaviour and encourage the adoption of the functional economy in the mobility sector by studying the case of Brussels. This thesis, therefore, debates the consumer adoption's potential of functional mobility by discussing its disincentives and motivations for consumers.

The functional economy is gradually taking hold in the mobility sector. However, companies seeking to develop in this sector often encounter difficulties related not only to the technical aspect of the change but also to its acceptance. Indeed, consumers' attitudes towards sustainability do not always seem to be converted into a change in consumer behaviour.

In this paper, we try to identify factors favouring the appeal and the consumer adoption of the functional economy in the mobility sector. To this end, we discuss how carsharing could enable consumers to accept more easily the transition to functional mobility.

The question that will guide our reflections throughout this thesis is: *How can carsharing become a driver for consumer adoption of the functional economy in the mobility sector by the Brussels population?*

To help us answer this global issue, we divide our questioning into several points

- What is the functional economy? How does functional economy apply to the mobility sector?
- What are consumers' barriers and motivations to functional mobility? And more specifically to car-sharing?
- How to motivate a change in consumer behaviour and encourage the adoption of functional mobility?
- What is the potential for consumer adoption of car-sharing? Can it contribute to facilitating the adoption of other functional economy offers in mobility?
- Which usage patterns and needs could and should car-sharing meet?

To be mindful, the purpose of this paper is not to determine whether carsharing is a sustainable business model or not. Given the many factors that come into play (e.g. grey energy, asset optimisation, rebound effect, transport substitution...), this question alone could fuel an entire thesis. Here we want to understand what role carsharing plays in the consumer's adoption of functional mobility and how it can facilitate the consumer's transition to functional mobility.

Brief outline and methodology

To try to provide an answer to our research question we have divided this thesis into 4 main chapters: literature review, methodology, results and discussion.

The first part is theoretical and lists the existing literature on the subject. We first focus on economic models with sustainable characteristics, in particular the functional economy. We then present different theories on consumer adoption and innovation diffusion to try to understand a little better what are the attitudes and behaviours of consumers. The last part of the literature review presents the current state of mobility in Brussels and the different car-sharing offers that exist.

This is then followed by a field study. To answer our research question, we decided to use an exploratory research strategy. The aim is to understand the potential for consumer adoption of car-sharing, to understand the needs, attitudes, and behaviours of individuals regarding mobility and to identify the type of usage they might be interested in. To carry out this exploratory research, we decided to rely on qualitative data collection. The field study will allow us to obtain qualitative data through individual and semi-structured interviews. This is in order to obtain profound insights into consumer attitudes towards car-sharing as well as to try to understand to which actual behaviour this leads to.

We then present the results obtained, including an overview of the interviewees' patterns of use and mobility needs and their perceptions of the existing means of transport.

In the last part of this thesis, we analyse these findings by linking them to the theory found previously to propose an answer to our research question. We then present the potential for consumer adoption of car-sharing and the role it can play in the adoption of functional mobility.

CHAPTER 1: LITERATURE REVIEW

This thesis starts with a theoretical part that presents the existing literature on the subject. First, it is essential to understand what is included in the concepts of functionality and functional economy. Therefore, this thesis starts with the definition of functional economy and the relation of this economic model with other existing and related models and concepts. We then present some marketing theories that attempt to explain consumer behaviour and consumer adoption. In the third part, we focus on mobility. We develop the current state of mobility in Brussels and present the different car-sharing offers.

Functional economy and other economic models

Functional economy

It is first essential to define what is hidden under the term “functional economy” in order to understand the different applications and implications it leads to in the mobility sector. Academics, although often agreeing on the main characteristics, do not agree on a common definition. Furthermore, a contrast can be found between French-speaking and English-speaking literature. Here are some of the main existing definitions.

French-language literature

In French literature, one of the leading authors of the “économie de la fonctionnalité” is Nicolas Buclet. He defines functional economy as the substitution of the sale of a good by the sale of the use of this good (Bourg & Buclet, 2005, p.2). It is therefore no longer a question of selling material goods to customers but rather services. The goods are made available to customers while the company remains the owner. (Bourg & Buclet, 2005). In the same idea, Van Niel (2014) mentions that it as an economic model where the object of the transaction is no longer the transfer of ownership of a material good but the function it performs. (Van Niel, 2014, p.2)

Christian du Tertre has developed another similar concept, that of the “l'économie de la fonctionnalité et de la coopération”. Here the focus is less on what the company offers but rather on the partnerships and relationships that need to be built between stakeholders, both private and public. These partnerships are considered essential for building effective functional solutions. (Roman & al., 2020)

In French-speaking literature, the economy of functionality is usually considered as an economic model, often perceived as sustainable, that contributes to achieving circular economy. The functional economy is seen as an economic model that "*would allow the dematerialisation of the economy and the decoupling of economic activity from its environmental impacts.*" (Roman & al., 2020, p.1). The functional economy is indeed more dematerialised than the traditional production economy, but this remains a partial dematerialisation. Even if it is the use that is sold, the notion of product remains central. It is above all a question of curbing the use of resources through the most efficient use of resources. (Meadows & al., 2012; Serra & Buclet, 2019)

L'ADEME, the French Agency for Ecological Transition, defined the functional economy as: "*The economy of functionality consists in providing companies, individuals or territories with integrated solutions of services and goods based on the sale of a performance of use or a use, and not on the simple sale of goods. These solutions should allow for a lower consumption of natural resources in a circular economy perspective, an increase in people's well-being and an economic development*" (IEEFC, 2022)

Here, the concepts of territory and cooperation are paramount. Cooperation is a necessary support for actors to develop integrated solutions that address the challenges of sustainable territorial development. (IEEFC, 2022)

In a nutshell, in French-speaking literature, the environmental and social impacts arising from the functional economy are usually considered as proper characteristics. This is not always the case in the Anglophone literature, which, as we shall see in the following section, considers functional economy mainly as a business model and not an economic model. Any possible societal improvements are then seen rather as consequences of the model than as proper characteristics. (Beuren & al., 2013; Mont, 2002; Roman & al., 2020)

English-language literature

"L'économie de la fonctionnalité", from French literature, has no exact translation. It is, therefore, necessary to extend our research to similar concepts, which are often used interchangeably despite their differences, and to be cautious about these differences.

In English-speaking literature, Walter Stahel is considered the pioneer of the "functional economy". Stahel's concepts of "functional economy" and "functional service economy" are

the closest to what could be found in French-speaking literature. However, there is little recognition of these concepts in English-language literature.

A functional economy “*optimizes the use (or function) of goods and services and thus the management of existing wealth. The economic objective of the functional economy is to create the highest possible use value for the longest possible time while consuming as few material resources and energy as possible. This functional economy is therefore considerably more sustainable, or dematerialized, than the present economy, which is focused on production as its principal means to create wealth and material flow*” (Stahel, 1997, p.1)

Over time he modified the terms several times to better distinguish it from the service economy and to put more emphasis on the notions of use and function. (Van Niel, 2014)

- New service economy (Stahel et Giarini, 1989)
- Utilization-Focused Service Economy (Stahel, 1994),
- Functional Economy (Stahel, 1997),
- Functional Service Economy (Stahel, 2006).

Except for Stahel, “functional economy” is very little represented in English literature. The most common translation, although the two concepts are not completely identical, is “Product-service system” or “PSS”. This product-service system, unlike the functional economy, is often seen as a simple business model (Tukker, 2015). Social and environmental improvements are only seen as possible consequences of PSS business models (Beuren & al., 2013; Mont, 2002; Roman & al., 2020). It will be developed in more detail in the following section.

Another concept to mention is the one of “access-based consumption”. Bardhi & Eckhardt (2012) define it as “*transactions that may be market mediated in which no transfer of ownership takes place*”. The consumer purchases consumption time of a good instead of the item itself.

PSS

Although not all academics agree on a common definition, most of them quote Goedkoop and al. (cited in Beuren & al., 2013, p.224): “A *product service-system is a system of products, services, networks of players and supporting infrastructure that continuously strives to be competitive, satisfy customer needs and have lower environmental impact than traditional business models*”. PSS is therefore defined as a combination of products and services which, in a system: “*provides functionality for consumers and reduces environmental impact.*” (Beuren & al., 2013, p.223).

Tukker (2004) mentions 3 types of PSS (Figure 1):

- First of all, the **product-oriented system** is when the company adds value to the products by adding extra services. The consumer no longer only buys the product but also benefits from the accompanying service. However, the emphasis is put on the product and ownership is still passed on to the consumer. Examples of this category are often related to added maintenance and monitoring services. (Aurich & al., 2010). An example would be add-on services to the purchase of a car such as extended maintenance guarantees.
- Secondly, the **use-oriented PSS**. The product remains at the centre of the offer, but ownership is no longer passed on to the consumer. The product remains in the hands of the provider, and it is the use of the product associated with extra services that is sold (Beuren & al., 2013). Providers are responsible for the maintenance and end-of-life issues. Common examples are renting, sharing and leasing. Examples are car rental services or car-sharing systems. (Aurich & al., 2010; Kang & Wimmer, 2008).
- The **result-oriented approach**, on the other hand, no longer focuses on the product as such. In this case, it is the result that is offered and sold to consumers instead of a product. The ownership of the product remains in the hands of the company. (Baines & al., 2007). This would be an approach where the customer would pay to go from point A to point B regardless of the means of transport.

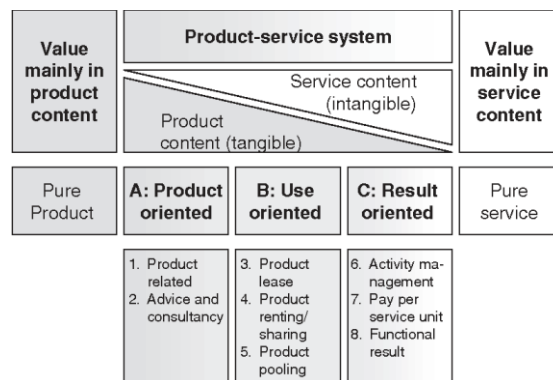


Figure 1: Product-service system typologies (Tukker, 2004)

While the first category cannot really be linked to the functional economy concept, the PSS typology allows us to identify two models that are compatible with the functional economy concept: the sale of usage functions and the sale of results.

Despite the many similarities, great care must be taken when translating the functional economy into the product-service system. Stahel warns that much of the literature on PSS misses two key issues of the Functional service economy, namely performance and accountability. The PSSs described by many scholars do not correspond to the criteria defined by the functional economy (Van Niel, 2014). Patrick Van Den Abeele (2014, p.19) states that: “*The Product-Service System (PSS) concept integrates the various strategies aimed at moving towards a functional economy*”. Thus, of what is encompassed under the term PSS, only some of it has characteristics compatible with functional economy.

Moreover, there is a classification of the functional economy that the PSS does not take into account, which Roy (2000) calls “shared utilisation service”, also sometimes called “collective consumption” (Cooper and Evans, 2000). This name covers economic models based on the sharing of goods and services between individuals (Van Niel, 2014).

Circular economy

The functional economy is seen as a way to dematerialise, at least partly, the economy and is thus a mean to achieve a circular economy model.

In the 1980s, Stahel advocated the idea that to optimise the efficiency of products, the focus should be on the closing of their life cycle. Limiting oneself to "end of pipe" approaches, for example by working on life extension or recycling, is not sufficient. It is necessary to migrate from the traditional cradle-to-grave approach to a cradle-to-cradle approach. According to

Stahel and Giarini (1989), the most suitable economic model for this would be one where the use of a good is more important than the good itself (Van Niel, 2014)

According to the ADEME (2022), “*the circular economy can be defined as an economic system of exchange and production which, at all stages of the life cycle of products (goods and services), aims to increase the efficiency of the use of resources and reduce the impact on the environment while developing the well-being of individuals.*”

Academics sometimes seem to have difficulty agreeing on a definition (Rizos et al., 2016; Yuan & al., 2008). However, despite these different schools of thought, they all question the linear economic system that has been the norm until now. Because resources are not infinite, humans cannot depend on a system based on this principle. (Allwood, 2014; Ellen MacArthur Foundation, 2013) The circular economy aims to change the paradigm of the so-called linear economy by limiting the waste of resources and environmental impact, and by increasing efficiency at all stages of the product economy. (Ademe, 2022)

The transition to a circular economy, therefore, implies prevention and efficient management of resources in 3 different areas: the supply side of the economy, the demand side including consumer behaviour, and waste management. Moreover, the circular economy is based on 7 pillars, each of which belongs to one of the areas. The functional economy is part of these pillars alongside sustainable procurement, eco-design, industrial and territorial ecology, responsible consumption, extension of the useful life and recycling. (Ademe, 2022)

Sharing economy & collaborative consumption

Over the last twenty years, a new way of consuming has developed strongly and has attracted the public interest, namely the “sharing economy”. It is based, among other things, on the principle of collaborative consumption. (Cheng, 2016; Hamari & al., 2015)

Hamari & al. (2015, p. 2047) defines collaborative consumption as “*The peer-to-peer-based activity of obtaining, giving, or sharing the access to goods and services, coordinated through community-based online services*”. To define the sharing economy, Cheng (2016) adds the notion of “underutilised goods”. The sharing economy allows access to underutilised goods through peer-to-peer sharing. The focus is on use and accessibility rather than possession. (Schor & Fitzmaurice, 2015).

Although the functional economy and the collaborative economy are two distinct concepts, they can be seen to overlap in certain situations. For example, some companies provide their customers a platform on which individuals can make goods they own available to other individuals. The company acts only as an intermediary, the possession of the good is not transferred but its use is shared between several individuals. This type of business model corresponds to both collaborative and functional models.

Platform economy

As just mentioned above, companies can play an essential role to favour shared consumption by providing platforms and acting as an intermediary.

In recent years, the platform economy has been growing and taking an increasingly important place in our society. The emergence of this new economy is leading to radical changes in how we consume and how we create value in the economy. (Kenney & Zysman, 2016).

A platform can be seen as an intermediary that creates a market for information, goods or even services. By extension, a platform is also an intermediary that brings groups together and promotes economic and social exchange and that therefore creates network effects. The current use of the term refers mainly to digital platforms, which involves at least three actors: the platform, the beneficiary of the service and the provider (Devolder, 2019).

Other terms are often used in the literature such as “collaborative platform economy” or “sharing platform economy”. These terms are sometimes used interchangeably, although they are differentiated by other authors. Fuster Morell & al. (2020) warn us that not all digital platforms have the idea of sharing as their main objective.

The platform economy is seen as having the capacity to contribute to sustainable development. It is often combined with all the other types of economies mentioned above, bringing great added value to their implementations. The collaborative or sharing economy would be much more complicated without the emergence of these platforms. Indeed, this type of economy offers a structure that acts as an intermediary between the seller and the buyer and facilitates the interaction between supply and demand. Platforms are there to coordinate the market between different actors, facilitating connections and transactions. It allows people to be matched quickly and efficiently with low search costs (Keller et al., 2018; Morell & al., 2020; Xue & al., 2020)

In addition, platforms can take care of the various legal bases necessary for the market to function properly and can create a sense of trust between users. They can therefore ultimately increase the potential for adoption in the market in question. Digital platforms can also have a big impact on the logistic barrier; allowing to facilitate certain actions and making possible things that are too complicated in a world without digital (Keller et al., 2018). Furthermore, the results often attributed to the collaborative platform economy is that it contributes to a greater sustainability of users' lifestyles. This is possible thanks to the sharing of existing goods and thus the optimisation of their use. (Lambrecht, 2016).

In conclusion, the platform economy, collaborative economy and functional economy are not interrelated. They can all exist independently. However, their combination is what enables functionality and the sharing of goods on a large scale.

Functional economy and PSS impacts

According to Krucken and Meroni (2006), the PSS may benefit the consumer, the provider, the environment, and society in a variety of ways. It has the potential to continually improve the process by increasing competitiveness through strategic alliances among those who produce and those who consume. Let's briefly discuss some of the impacts of functional models.

For consumers: There are a few benefits of functional economy to consumers. Beuren & al. (2013) first mentions that PSS strengthens provider-consumer relationships. Functional economy also allows more flexible access to products, no need to buy a product to use it once. Customers don't have to worry about maintenance or end-of-life issues, and it is often considered cheaper than purchasing the product. (Beuren & al., 2013; Mont, 2002). On the other hand, it changes people's consumption habits meaning that they would need to completely change the way they consume.

For companies: Beuren & al. (2013) see functional business models as a way to follow the sustainable trend. Because consumers are getting more and more interested in environmental issues, it is an opportunity to attract them. The companies' relationships with their customers are also strengthened which fosters loyalty (Aurich & al., 2010; Beuren & al., 2013). Once again, functional economy directly impacts the nature of the transaction that takes place between the company and its customer and therefore changes the way they produce.

For the society and the environment: Because of its supposed economic, social and environmental benefits, the functional economy is often presented as a sustainable economic model. (Roman & al., 2020). According to Bourg & Buclet, (2005), it is a way of breaking with our unsustainable evolution. It is said to become more environmentally friendly in production, consumption and disposal stages (Van Niel, 2014) It is described as a model able to optimize and minimize resource consumption by dematerialising, at least partly, the economy. Since it is no longer the good itself that is sold but its use, the provider is incentivised to produce the most sustainable good possible and to maintain it for as long as possible. It might lead to products being reused, repaired and recycled. (Beuren & al., 2013; Roman & al., 2020) Furthermore, pay-per-use emphasises the cost of each use and therefore discourages consumption. (Tukker, 2004)

After all this, the model may seem societally ideal, but some factors act negatively, making it difficult to assess the overall impact. Firstly, Mont (2002) points out that these use-based models allow users who previously could not afford the good, to be encouraged to consume more. Tukker (2004) points out that users would tend to pay less attention to taking care of the objects they do not own. The final consequence could therefore be an earlier deterioration and disposal. Furthermore, since consumers save money on these goods, they may decide to spend it on other goods that may have worse environmental consequences. This rebound effect and the uncertainty surrounding it makes the evaluation of the impact of the functional economy almost impossible.

Consumer adoption of the functional economy

Consumer adoption

One of the major challenges for organizations to implement a successful PSS and functional strategy is the lack of consumer adoption which therefore slows down the transition to a sustainable, paperless and circular economy (Tukker, 2015).

Innovation adoption model and decision-making process

The term "innovation" can be defined as the "*generation, acceptance, and implementation of new ideas, processes, product or services*" (Thompson, 1965, p.2). It is therefore possible to innovate by implementing new ideas without touching the product as such. Indeed, there are different categories of innovation. Technical innovation is related to the product or process, organisational innovation refers to management and structure and finally, business-related innovation refers to the business model or market structure. (Wirtz, 2011)

The transition to functional economy impacts by definition the business model since the sale of a good is replaced by the sale of its use. The implementation of the functional economy can therefore be seen as a business-related innovation.

The diffusion of innovation is the process of adoption or non-adoption of an innovation by consumers. Indeed, the success of an innovation depends on consumer acceptance. (Hansen & Wakonen, 1997)

One of the most famous and cited models for innovation adoption is that of Rogers (cited in Kaminski, 2011) According to Rogers the mechanism of adoption can be seen as a 5-step process.

- Knowledge: Awareness phase, the consumer becomes aware that the innovation exists and discovers its main characteristics
- Persuasion: The individual develops a favourable or unfavourable attitude towards the innovation
- Decision: The individual makes the decision whether or not to adopt the innovation
- Implementation: The individual discovers and tries the innovation
- Confirmation: The individual judges the results obtained from using the innovation

To understand consumer behaviour, it is also necessary to understand what are the steps that lead to the consumer purchasing a good or service. Guichard et al. (2016) present a 5 steps decision-making process.

- Recognition: The consumer realises that he has a need, a problem, and that he wants to find a solution to fulfil this need
- Information search: The consumer will consider a multitude of factors and a multitude of criteria that interest him concerning his future purchase to make the best possible comparisons among all the available offers.
- Evaluation: The consumer has all the information; he has to choose the criteria on which he will compare the offers.
- Decision making: The consumer has all the capacities to choose the option that best meets his needs.

Many criteria are quite common to all consumers, such as price, quality, ease of use, brand and many others. However, these criteria can of course vary depending on the consumer firstly, and secondly, depending on the time. Some consumers will place more importance on high quality without paying attention to price, while others will only look for the cheapest. In the same idea, price and brand seem to lose importance in recent years compared to criteria such as ecological impact or energy consumption which are criteria that seem to be of paramount importance to many consumers today. In short, the consumer will always seek to find the most suitable solution to meet his or her needs. It is therefore essential to take into account the key criteria of the targeted consumers to offer them a solution that will suit them.

Consumers profiles

Rogers in his book “Diffusion of innovations” (cited in Kaminski, 2011) divides consumers into 5 categories according to their acceptance of an innovation (Figure 2).

- Innovators: These are the first who are ready to adopt an innovation. They are willing to take the risk even though they did not get any feedback from others.
- Early adopters: They follow soon after to adopt the innovation.
- Early majority: Take little risks and adopt the innovation once it has been tested and approved.

- Late majority: Adopts the innovation only after the majority of the population has also adopted it.
- Laggards: These are the last ones. They have an aversion to change. They don't like to change their habits and only do so when necessary.

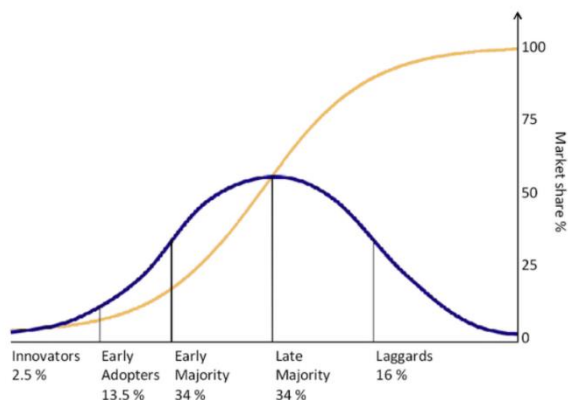


Figure 2: Rogers' innovation adoption curve (Rogers, 1962)

Rogers classified consumers according to their acceptance of an innovation, i.e. their capacity to adapt quickly or not to a change and therefore the ease with which they can change their consumer behaviour. Categories are ranked increasingly in terms of their acceptance of change. Innovators have low barriers to change while laggards have a very strong aversion to change. To achieve a larger market share, it is therefore increasingly necessary to identify consumer' barriers and find ways to overcome or bypass them.

Attitude-behaviour gap in sustainable consumption

Following this section on the decision-making process, it is important to mention that finding the real criteria for decision-making is not always simple. Indeed, it often appears that the criteria expressed by consumers are not always the ones leading to their actual behaviour. This is referred to as the "attitude-behaviour gap".

In the literature, an "attitude-behaviour gap" is encountered frequently when analysing consumer behaviour in relation to sustainable consumption contexts. (Shim & al., 2018; White & al., 2019). In this regard, attitude-behaviour gap is an inconsistency between sustainable consumption attitudes, that consists of beliefs, feelings and intentions of the consumer, versus the consumer behaviour, its real actions. Many consumers say they are concerned about the environment and report favourable attitudes towards pro-environmental behaviours (Trudel and Cotte 2009), but this is not always reflected in their actions and purchasing behaviour.

(Auger and Devinney, 2007; Roynes & al., 2011). “Attitude-behaviour gap” can be seen as an ironic behaviour of consumers that led to a much lower adoption rate of eco-friendly products than what their attitudes towards green consumption would suggest.

This suggests that companies' efforts to promote their sustainable products have indeed led to consumer awareness and even interest but have failed to convince them to buy. (Shim & al., 2018) Since there is consumer interest in eco-friendly products but there is also a lack of willingness to purchase them, it "*indicates that consumers get stuck in the decision-making stage due to perceived barriers or bottlenecks.*" (Shim & al., 2018, p.1410). Shim & al. (2018, p.1410) state that "*In order to stimulate the consumption of eco-friendly products, consumers must advance to the next decision-making stage by overcoming the perceived barriers*".

Consumers' barriers to functional economy

While the functional economy seems to be successful in business-to-business contexts, business-to-consumer and peer-to-peer are lagging behind. Indeed, in many situations, use-oriented solutions face a lack of consumer adoption. (Vogtlander, 2017). Identifying and understanding the consumers' barriers slowing down the adoption are therefore necessary to increase adoption.

The aim is not only to design a sustainable economic model but also to understand all the conditions to be fulfilled and all the strategies to be put in place for it to function properly (Tukker and Tischner, 2006). The topic of barriers to PSS has been addressed in many papers by many different authors and it is necessary to highlight the most relevant barriers in relation to the issue addressed in this work.

The article by Annarelli & al. (2016) shows the different barriers to PSS and the recurrence of these in different pieces of literature. What can be concluded from this graph (Figure 3) is that many different barriers can be discussed regarding PSS but that acceptance and resistance to change, both at the customer and company level, are the most frequently mentioned.

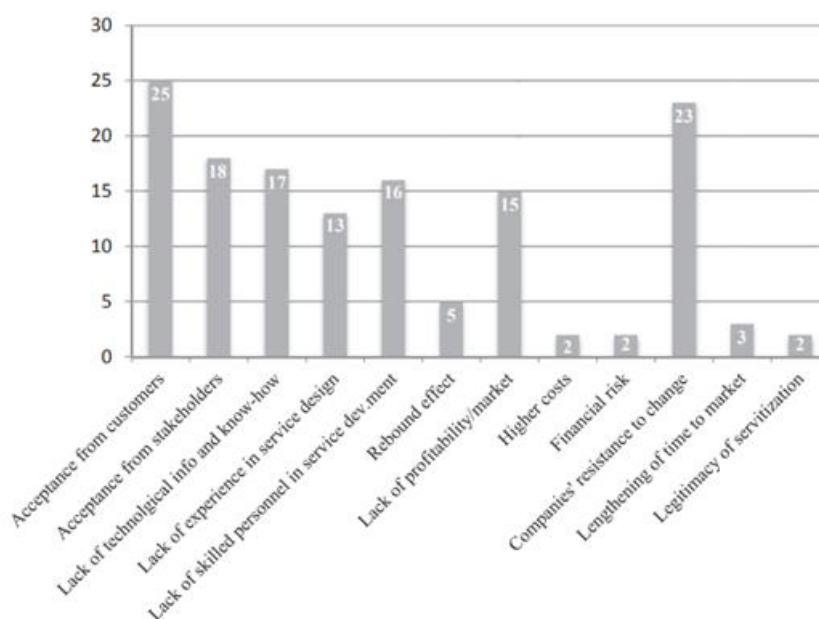


Figure 3: Histogram of PSS barriers (Annarelli & al., 2016)

Besch (2005) agrees on this point, explaining in her article that, following a multitude of interviews, a barrier that recurred in all sectors was the resistance to change of human beings. Indeed, in general, people do not want to change their habits, are very loyal to existing structures and have difficulty moving to other structures.

Variation of the barriers: value and duration of use

Before listing the barriers, it seems quite obvious that these barriers will depend on the product one seeks to use. Indeed, these barriers intensify more concerning products with specific characteristics. For, example, products with a high financial or sentimental value, dangerous products or products used on a daily and regular basis seem to be less suitable for the functional economy.

Tunn and al. (2021) remind us that the importance of each of these barriers on consumer decision-making can vary depending on the type of services provided. The authors pay particular attention to the duration of use. The duration of use refers to the length of time a consumer receives exclusive access to the product. (Bardhi & Eckhardt, 2012) Short-term or long-term use does not lead to the same consumer-product relationship (Belk, 2014).

In the case of short-term product access, barriers related to touchpoints and reluctance to share are predominant. In this case, Tunn and al (2021, p.2808) state that "*the service aspects are*

crucial while the product needs to be primarily functional". The consumer's main expectation is therefore to have access to it easily and quickly, and the product's own characteristics are less relevant at the time of choice. For long-term use, use-related barriers have the most influence. *"In contrast, consumers seem to evaluate long-term use AB-PSS similarly to ownership, valuing products with superior product characteristics during use, such as bicycles with multiple gears and highly comfortable clothing."* (Tunn and al., 2021, p.2808)

Because we want to study whether consumers are ready to move from private car-based mobility to functional and diversified mobility, we focus on the barriers that consumers might have for valuable assets, sometimes even with sentimental value, and for short-term use situations.

Numerous inhibitors to consumer acceptance of functional economy are cited in the literature, they are grouped hereafter in different categories. We will also make the link with the classification of barriers in the AB-PSS proposed by Tunn et al (2021). The authors classify barriers as touchpoint-related, use-related or concept-related.

Culture

One of the interpretations of Jahoda (2012) defines culture as an addition of shared knowledge and beliefs shared among people. Luring et al. (2018) also developed two different concepts for culture, functionalism and constructivism. The first one explains that culture is a mix of values, beliefs and habits that are transmitted by a social group of people. The second one views culture as an intricate network that can be managed in different ways by individuals being part of the same social group.

From a western cultural point of view, consumption is ingrained in people's minds. Indeed, since the post-war years, there has been a sharp increase in purchasing power, major technological improvements and a greater variety of products and services which have led to significant changes in consumers' consumption habits. This trend gradually led consumers to adopt or aspire to a lifestyle of material possessions and high-quality equipment, as well as to fast or short-term consumption behaviour. Over time, consumption and possession have become culturally embedded, conferring identity, self-respect and a form of social participation (Reisch, 2008). It is therefore essential to go further in understanding ownership importance and how it is a barrier to the functional economy.

Reluctance of ownerless consumption

“An aspect of the likely acceptance of PSS by consumers is concerned with the emotional value which they give to possession. Product ownership is a way of self-expression” (Catulli, 2012, p.787)

Consumers' reluctance to change might be linked to cultural barriers as, among others, the need for ownership. With functional economy, the ownership is not transferred to consumers anymore. Then, while some people thought that the change in ownership habits would be quick and easy, consumer demands and buying behaviours are actually more complex. The assumption that the consumer would be more interested in using a good than in owning it is not yet part of the reality. Systems like car-sharing are, for now, in most cases, limited to a niche market (Mont, 2002).

Tukker (2015) explains that it is mainly due to the inability of firms to create enough value to have a competitive advantage against the main western cultural preferences concerning ownership. The consumer must have the same satisfaction with a need fulfilled without ownership as with a need fulfilled with ownership. As explained by Behrendt et al. (2003), the current problem is that ownership is a well-established norm and that the customers would have to change their behaviour towards consumption. James and Hopkinson (2002), also add that ownership is not only useful to fulfil a need for a private user but also to create a status, an image, and a sense of control in the society which is less possible in an ownerless type of economy. Indeed, material goods can be seen as an extension of the consumer's identity. Catulli (2012) gives the same factors about this shortage of diffusion, being the lack of control and flexibility, the loss of symbolic value and the stigma concerning non-ownership that arise with this principle of functional economy.

Some people can also have a high level of materialism which can create a barrier to PSS. Materialism can be defined as the importance someone gives to possession of a good (Belk, 1988). He even goes further, dividing materialism into two distinguished parts, terminal and instrumental materialism. Terminal materialism can be seen as the willingness to keep control of the possession while instrumental materialism is more about the satisfaction of using functionalities of goods. People with a high degree of terminal materialism will be less likely to enter a functional type of consumption.

Finally, another factor about ownership's barrier is the fact that the life cycle cost is difficult to calculate for a common user which leads to misunderstandings of the ownerless-based

solution's advantages (White et al., 1999). Life cycle cost is “*an approach that assesses the total cost of an asset over its life cycle including initial capital costs, maintenance costs, operating costs and the asset's residual value at the end of its life*” (Sesana & Salvalai, p.213). Such analysis is rarely performed by consumers, which is might be detrimental to functional economy.

Reluctance to share

Sharing can be defined as a process of giving what is yours to others for them to use it or the other way around but without transfer of ownership and without expectation of reciprocity (Belk, 2007). Belk (2010) also distinguish two parts of sharing: sharing-in and sharing-out. Sharing-in is more about the process of sharing within a small and trusted circle such as relatives or close friends. With this type of sharing, the ownership can sometimes be seen as shared. Sharing-out is broader and does not especially include people close to you and ownership is no longer shared. For the purposes of this thesis, both will be interesting to analyse.

Some academics also prove that the willingness to share is also closely linked to the social distance between consumers. People who are closer to each other tend to be more willing to share than people who are further away socially (Furby, 1978). It is also a reason why the term sharing is used instead of commodity exchange, the goal being to create a sense of community and try to decrease the effect of social distance (Kennedy, 2016).

Another factor of reluctance to share is the lack of trust in others. A fear related to not knowing the other users. Indeed, reluctance to share is often linked to fear about the condition of the object when you use it after others. In the interviews conducted by Catulli & al.(2017), one of the main reasons given was the lack of confidence regarding safety and the fear of not seeing problems and being held responsible for them afterwards. Consumers are concerned about the health, privacy and safety risks associated with equipment that may have been misused by others (Catulli, 2012). In addition to this lack of trust, the consumer is sceptical about the motives of the providers. They also doubt the provider's ability to deliver a service that meets their expectations. The consumer would therefore frequently feel a lack of trust in the provider. (Rexfelt & Ornäs, 2009)

Touchpoint-related inconveniences & uncertainties

This category includes everything that may be perceived as inconvenient and uncertain at the touchpoint with the provider. Because touchpoints "*form the link between the service provider and the customer*", they are "*central to the customer experience*" (Clatworthy, 2011, p. 16). It is therefore possible that the consumer is slowed down in the adoption of innovation at this level. Indeed, consumers often seem to regard the functional economy as impractical for several reasons. Uncertainty about accessibility or availability, difficulty of use, and the extra effort required are often mentioned.

In a study on the adoption of use-oriented PSS by young consumers in medium and small cities by D'Agostin and al. (2020), the surveyed population highlighted unavailability as the main barrier to adoption. Since the user no longer owns the product, they fear that it will not be available at the right time. The product cannot necessarily be used at all times independently of other users. (Tunn & al., 2021) The consumer would experience "*emotional costs concerning uncertainty whether the shared resource is available when needed or not (i.e., consumer uncertainty about stockouts)*" (Akbar & Hoffmann, 2018) The functional economy thus gives rise to concerns about product availability for consumers, which hinders their acceptance and adoption. An important factor for consumer acceptance is that "*PSS must be available wherever and whenever needed*" (Rexfelt & Hiort af Ornäs, 2009, p.677). However, consumer perception does not support this. Indeed, consumers have the impression that their expectations in terms of availability will not be met. (Catulli, 2012) Akbar and Hoffmann, (2018) warn us that it is important here to distinguish between the actual risk of stockout and the risk perceived by the consumer. Indeed, the former should be addressed by better logistics and the latter by better communication with the consumer. In addition to not always being available at the desired time, a PSS solution is sometimes not accessible/available in a nearby environment, i.e. in the neighbourhood, in the city or in the region. (D'Agostin & al., 2020)

Secondly, this business model generally requires the consumer to make an effort to access the product. This effort is to be made by the consumer, in the form of additional and undesirable activities, to gain access to the product. A concrete example is a consumer who wants to use a bike-sharing service but would first have to walk 15 minutes to access it. Tukker (2004, p.253) said that the user now "*has to put time and effort into getting access to the material artefact*". Added to this, is the effort that the consumer has to put in to learn how to use the product. (Tunn & al., 2021)

In connection with the barriers mentioned above, another factor cited is the lack of flexibility. Since the user does not have exclusive use of the good, some kind of planning and organisation is sometimes required (Catulli & al., 2017; Tunn & al., 2021)

In short: *“A PSS has to offer easy service for the consumer or they may be critical about the time or effort required, especially in cases where the end result is uncertain. When a product is not readily accessible, the customer may perceive a sacrifice”* (Armstrong & al., 2015)

Reluctance to commit

“An often-quoted aspect of PSS is long-term relations between customer and service provider, which may be a prerequisite for industry being able and prepared to provide customised solutions. However, long-term relations also mean commitments. From a financial point of view, PSS result in customers paying continuously instead of once, either for access to a product or for goal fulfilment.” (Rexfelt & Hiort af Ornäs, 2009, p.687)

Indeed, the consumer may stop in the marketing funnel before consumption because he does not want to commit, for example, to a contract or to regular payments. He faces a reluctance to commit. (Tunn & al., 2021) This is a concept-related barrier. The functional economy is based on a more regular and distributed payment method. In contrast to the purchase of a good where the consumer only pays once before perceiving the use of the good as free. In a PSS system, the user may experience a negative perception of a high price per use. (Tunn & al., 2021)

D'Agostin & al (2020) also point to the consumer's preference to pay to own the product. The consumer will tend to feel frustration when he spends money without owning the product. As seen above, the concept of ownership still has an important place in our western culture even if many scholars present PSS and functional economy as financially attractive. Arekrans and al. (2022) mention a perception of higher costs by the consumer in the case of access-based consumption, which acts as a barrier to its adoption.

Poor expectations

Through all the categories presented above, it can be observed that consumers have the overall impression that their needs and expectations cannot be met by functional solutions. The user expects for example that: products will not be available when needed, the lack of ownership will decrease his well-being and comfort, the good will be poorly maintained... Some negative perceptions tend to demotivate consumers to adhere to PSS. Indeed, bad expectations linked to PSS can slow down its adoption. Frequently mentioned are for example the perceived poor performance and poor comfort and the disbelief in ecological offers (D'Agostin & al., 2020)

Indeed, consumers are sometimes concerned about their direct experience with the product, so these are the use-related barriers. Whether directly related to the product, or related to its upstream use by other users, the consumer is sometimes suspicious of the condition of the good and the product quality (Tunn & al., 2021) Two of the main factors that lead to the negative perception of PSS are the lack of trust in the provider and the lack of trust in other users. As mentioned in the category "reluctance to share", consumers are sceptical about the provider's motives and do not trust other users. They, therefore, doubt, for example, the quality of the product, its condition, durability, hygiene and maintenance. (Arekrans and al., 2022; Armstrong & al., 2015)

Motivate a shift in sustainable consumer behaviour

White, Habib & Hardisty (2019) developed a framework based on a literature review on how to shift consumer behaviour to be more sustainable. They identified the psychological factors that influence sustainable consumption and pro-environmental behaviours of consumers. Knowledge of these factors helps in knowing how to encourage consumers to engage in pro-environmental behaviours.

The framework is represented by the acronym SHIFT and develops 5 main drivers of sustainable consumption: Social influence, Habit formation, Individual self, Feelings and cognition, and Tangibility.

Social influence:

Social factors, which are impacted by the presence, behaviours and expectations of others, are the most influential in motivating a change in consumer behaviour. It includes 3 categories.

- **Social norms:** Sustainable consumer behaviour is impacted by what is or is not considered socially appropriate. These social norms or beliefs have a powerful influence
- **Social identities:** Identifying oneself as belonging to a pro-environmental group will have a major impact on whether the customer engages in sustainable actions.
- **Social desirability:** consumers tend to engage in pro-environmental behaviour if it is perceived positively by others, they want to make a positive impression

Habit formation

In our daily lives, many habits are not environmentally friendly, to make consumer behaviour more sustainable, convincing the consumer to change his habits will be necessary. Habits are behaviours that have become automatic because they have been repeated many times. They are therefore very difficult to change. A person with eco-friendly habits will therefore tend to consume sustainably on a regular basis.

"Whereas some sustainable behaviours require only a one-time action, many other sustainable behaviours involve repeated actions that require new habit formation." (White, Habib & Hardisty, 2019) In the case of mobility, buying a less-consuming car is an action that does not require a massive change of habits. In contrast, regular car-sharing requires the creation of new habits in the long term.

The individual self

Another strong influence on consumption comes from the individual self.

- **Self-concept:** People want to maintain a positive image of themselves and their actions. This is reflected in their consumption. However, self-concept can also slow down sustainable consumption. Indeed, an individual might avoid changing his behaviour if it threatens his self-identity (e.g. travelling). They are unwilling to change their behaviour for fear of experiencing identity loss. The same problem exists if an individual's possessions contribute to their identity, they will not be willing to give them up (Belk, 1988).
- **Self-interest:** To motivate a shift in consumer behaviour, the individual must also see a personal interest. He or she must therefore be able to find self-benefits, and these must be sufficiently emphasised. (Gleim & al., 2013)

- Self-efficacy: “*self-efficacy involves beliefs that the individual can engage in the required action and that carrying out the behavior will have the intended impact.*” (White, Habib & Hardisty, 2019 cites Bandura, 1977). Consumers are most likely to choose sustainable solutions when self-efficacy is high and therefore when they are confident that this behaviour will make a difference.

Feelings and cognition

Consumers would then tend to opt for their consumer attitudes and behaviour by taking one of two routes. The first one is rather feeling-driven. It is a rather emotional and intuitive route. The second is more reflective, based on cognition.

- Positive and negative emotions: To motivate customers, negative emotional states, such as fear, guilt or sadness, can be created regarding to whether or not engage in sustainable behaviour. However, one must be careful not to create too intense or too few negative emotions. Both could lead to inaction. If these emotions are too strong, a feeling that the threat is inevitable may arise which discourages the consumer. Conversely, if there is no sense of danger, consumers do not feel the need to make further efforts. Additionally, consumers are more likely to engage in sustainable behaviour when they gain some positive effect from it, such as pride or joy.
- Information and knowledge: to engage in pro-environmental behaviours consumers need information about the desired behaviour and its consequences. However, marketers need to be careful to avoid the consumers’ lack of exposure to information but also information overload and confusion.

Tangibility

Outcomes of pro-environmental actions can be seen by consumers as abstract and vague and can be hard to measure. They are often surrounded by plenty of uncertainty about the problem or its solution. In addition, consumers are more likely to consider the consequences in the near future than in the distant future.

Mobility context

Brussels mobility context

To tackle the issue of the functional economy in the mobility sector in Belgium, it is essential to have a more precise overview of the mobility context in order to understand more concretely the environment to be addressed. To do this, let's examine the results of statistical studies carried out by the VIAS Institute (2022) concerning mobility.

Car mobility in Belgium is significant. Indeed, if we compare with our neighbours, the Belgian motorist drives on average 6% more kilometres per year than the Dutch and 9% more than the French even though our country is smaller. A Belgian travels on average 22 km each day to get to work compared to 15 km for a French person. Belgians are very inclined to use car mobility. It is important to highlight the fact that the car is the number one mode of transport in Belgium, even if it has decreased by 15% between 2010 and 2017, when at the same time the bike has increased by 10% to reach 16%.

In Brussels, there are many different means of transport. There is the car as in the whole country, but also public transport, including the metros, buses and trams managed by the STIB and the trains managed by the SNCB. "Soft" means of transport are also an option such as walking and cycling, and finally, there are the means of transport that are much less used, and which will therefore be grouped in the "other" category like electrical scooters to name only one of many.

According to Brussels Environment (Environnement.brussels, 2022), the car is the main mode of transport for the inhabitants of Brussels, being used 46% of the time, compared to 24% on foot, 21% by public transport, 4% by bicycle, 3% by train and the remaining 2% by other means. However, the figures are different depending on the situation and the place of destination. When it comes to travelling from Brussels to Brussels, walking is the most popular means of transport with 35%, the car is only second with 30% and public transport is 28%. It is in transport from Brussels to Flanders and Wallonia that the car is predominant. Indeed, the car comes first with an average of 58% towards Flanders and 68% towards Wallonia. The train is then at 34% towards Flanders and 28% towards Wallonia and the other means of transport are therefore little used.

Another relevant statistic is that one household out of two does not own a car in Brussels. There is a very strong decrease. 75% of households owned a car between 1999 and 2004. However,

this statistic only seems to apply to Brussels. With 82% of households owning a car on a national scale, it is easy to see that in the other two regions of the country, the population is much more inclined to own a car. (Environnement.brussels, 2022)

Belgian mobility cannot be discussed without mentioning the company car. According to a study by the Securex Group, one in four private sector employees in Belgium has a company car. This solution is interesting for both the employer and the employee thanks to the tax advantages it offers. This figure has increased in Wallonia and Flanders over the last three years. However, the trend in Brussels has decreased from 25% to 22.4% of employees. (Dugesne, 2022)

Then, if we talk about mobility in Brussels, we can't avoid mentioning the traffic jams. Brussels is among the world's cities with the most time lost in traffic jams, with 44 minutes lost on average, and the figures keep increasing year after year.

Concerning ecological impacts, the Belgian federal website climat.be (2019) expressed that emissions from the transport sector will account for 20.4% of total emissions in 2020 and that this increase would be largely due to road transport, which accounts for 96.0% of total emissions in this sector. This big use of car transportation and the increase in congestion is not helping to decrease CO2 emissions.

BCR mobility plans and measures

In recent years, improving mobility in Brussels has been one of the priorities of the authorities. In concrete terms, this has led to the creation of numerous new infrastructures, changes in the legislative framework, the emergence of numerous regional projects and plans, etc.

In Brussels Capital, two administrations play a major role in the transition to more sustainable mobility:

- Brussels Mobility is a regional public service of Brussels. It is the Brussels administration in charge of equipment, infrastructure and transport. (Brussels Mobility, 2022a)
- Brussels Environment is the Environment and Energy Administration of the Brussels-Capital Region. They are responsible for regional policies relating to the environment. (Environnement.brussels, 2022)

Good Move

When talking about mobility in the Brussels-Capital Region, it is impossible not to mention the Good Move plan, the regional mobility plan 2020-2030. (Bruxelles mobilité, 2021a) This plan sets out the main political orientations in the field of mobility for the next years.

“The plan resolutely opts for a pleasant and safe city, comprised of peaceful neighbourhoods, connected by intermodal structural corridors and focused on efficient public transport and improved traffic flow. The plan's measures are designed to provide each user with adapted, facilitated and integrated mobility solutions, enabling them to choose the most appropriate mode of travel for each of their trips, depending on their destination and needs at a given time.” (Brussels Mobility, 2022b)

The ambitions of the regional plan include (Brussels Mobility, 2022b)

- Reducing the use of private vehicles through a range of attractive offers that meet different travel needs.
- Improving the mobility service by making it clearer and more accessible largely through the development of MaaS (Mobility as a service).
- Ensuring an efficient and developed transport network.

Good Move aims to provide users with a full range of integrated services that promote the combination of travel modes with the objective of eliminating the need for private car ownership. This requires an approach to mobility as a service. A distinction must be made between the practice of mobility and the ownership of a vehicle (Bruxelles mobilité, 2021b)

The term *mobility as a service, MaaS*, includes the integration of transport services into digital applications and platforms. A mobility as a service approach separates the practice of mobility from the ownership of a vehicle. By combining existing transport networks and new modes of travel, MaaS offers users personalised travel solutions and adapts to their travel needs. Although it is well on the way, the mobility offer today is not yet presented as an integrated service but rather as a set of products and concepts. The ambition of the region is that the user will be able to access the combined offer of transport means through a single interface. (Brussels Mobility, 2022c)

Company cars alternatives

Recently an alternative to the company car has been introduced, the *mobility budget*. The inclusion of this mobility budget could encourage a shift in employee mobility towards greater multimodality. The mobility budget is presented as an alternative to the company car that the employee can decide to offer to his employees. Any employee entitled to a company car could give it up in favour of a range of more sustainable alternatives.

The budget is divided into 3 pillars. The employee can freely choose the combination that suits him/her (Autodelen, 2022; Budgetmobilité, 2022; Mariscal, 2022):

- Pillar 1: The employee could choose a more environmentally friendly company car, either an electric car or a car with low emission standards.
- Pillar 2: The employee could use this budget in alternatives to private car travel. This pillar includes the purchase, rental and maintenance of bicycles, scooters, electric motorbikes, etc. But also, all subscriptions and tickets for public transport for the worker's family and shared solutions such as car-sharing, car-pooling, bicycles or scooters belonging to a fleet or to individuals. This pillar, therefore, covers the costs of soft mobility, public transport and shared solutions.
- Pillar 3: The employee could request a cash payment of the remaining amount.

Other measures

The Brussels-Capital Region aims to achieve climate neutrality by 2050. This transition to low-carbon mobility will be achieved by gradually eliminating vehicles that run on diesel or petrol. (environnement.brussels, 2022a) Among the measures put in place, the Brussels-Capital Region has become a "low emission zone (LEZ)" since January 2018. This measure bans the most polluting vehicles from driving within the zone. (lez.brussels, 2022)

One of the measures introduced to encourage people to give up their private cars is the "Bruxell'Air" bonus. The Brussels-Capital Region offers its inhabitants financial support when they opt for transport alternatives to the private car. After the deregistration of a registered vehicle, Brussels residents can apply for a bonus. This is received in the form of a mobility budget that can be used according to preferences in the different alternatives. The amount depends on the profile of the individual (500, 700 or 900€). The aim is to encourage people to give up their private cars and to promote the use of more sustainable and environmentally friendly means of transport. (environnement.brussels, 2022; Bruxelles Mobilité, 2022c)

Functional mobility

With the definition of the functional economy, being “*the substitution of the sale of a good by the sale of the use of this good*” (Bourg & Buclet, 2005, p.2), functional mobility can therefore be defined as all means of transport offering vehicle use instead of vehicle ownership. Consumers do not own the means of transport but pay for their use over a certain period of time. Functional mobility is, therefore, a mobility proposition that, according to the principle of functional economy, would provide an integrated solution of several business models (e.g., U-PSS, collaborative models...) offering access to a good or a service rather than the good itself (e.g., public transport, shared cars or bikes, carpooling, taxis...).

In concrete terms, in the BCR, functional mobility solutions exist, both, in public transportation and private transportation. With public transport, you pay to use trams, metros, buses or trains, and you use them at the same time as others. With private transportation, you pay to use a car, a bike or any other means of transport without any transfer of ownership. This can be done in several ways, which will be presented with the car example, but which can be transposed to all other means of transport such as bicycles or scooters or all means of private transportation.

4 main business models provide car use to customers: leasing, renting, sharing and pooling. These can be differentiated by several attributes. Firstly, in the case of renting, leasing and sharing, the consumer has single access to the product. In the case of pooling, several consumers use the product simultaneously. Secondly, the duration of access to the product. Leasing offers long-term access. With sharing and renting, the use is rather short, and the product is produced for sequential use by many different consumers. The third differentiating feature is the involvement of the consumers. When a company makes available to its customers products that it owns (whether it has purchased or produced them itself), this is renting. On the other hand, when individuals own the product and share it through a third-party company, it is called sharing (Lamberton and Rose, 2012). (Catulli et al., 2017) However, great care should be taken with the term car-sharing, as it represents the sharing between individuals, but it is also used in the literature to refer to short-term B2C rental. In this thesis, both, the B2C car-sharing and the car-sharing between individuals will be discussed.

Please note that carpooling and carsharing are two different things. In carpooling, the journey is shared. A private driver takes a passenger to share the journey. (e.g.: carpool.be or blablacar) With car-sharing, however, it is the vehicle that is shared.

Types of car-sharing

B2C car-sharing

In B2C car-sharing, a company owns the vehicle fleet and makes it available to its users in exchange for a fee (usually based on the time or number of kilometres driven). A vehicle is therefore used consecutively by several users. (Bruxelles mobilité, 2017)

- Loop services or roundtrip: Cars are made available to users at different stations. The consumer can then use the car by the hour, by the day, etc. The vehicle used must be picked up and dropped off at the same station (e.g., Cambio)
- One-way service: Here the user does not have to return the vehicle to the original location. This is generally used for shorter-term rentals, from minutes to a few hours. This system is generally more suitable for dense areas with higher demand.
 - Station system: The operator has several stations where it is possible to pick up and drop off a vehicle. The car is not tied to a particular station. The user can therefore make a journey between two stations without having to return the vehicle to the original station. (e.g., GreenMobility)
 - Free-floating: In the case of free-floating, the vehicle can be parked in any public parking space in an area determined by the operator. (e.g., Poppy)

Car-sharing between individuals:

- Car-sharing between groups/communities: Here it is groups of individuals, usually neighbours or locals, who decide to self-organise. It is generally considered as sharing between neighbours. One or more vehicles are then made available to the community. The car can be owned by one individual, by several individuals or by cooperatives. The aim is not to make a profit but to share the actual costs of using the car. The management can be done independently and informally, however, some platforms facilitate the sharing of vehicles within a group of individuals by allowing, for example, fleet management or legal aspects such as insurance. (e.g., Cozywheels & Wibee) (Bruxelles mobilité, 2017)

- Peer-to-peer: P2P is moving away from sharing and collaboration and goes towards a system of vehicle rental between individuals. This is generally done through a platform on which the user can rent the car he owns or can rent the car of any other member. Each member therefore has access to the cars of any other user at a price set by the owner. There is therefore less social interaction between car sharers, everything is done through the platform. (e.g., Getaround) (Bruxelles mobilité, 2017)

Car-sharing companies in Brussels

Cambio

Cambio provides a B2C loop car-sharing service. The company offers a wide range of vehicles that it owns, from city cars to vans and larger models. The cars are available 24/7 and can be used for flexible durations as long as they are returned to the originating station in time. The stations are visible on the app, and it is then possible to book the car at any time. Cambio has more or less 240 stations in Brussels for approximately twice as many cars. (Cambio, 2022)

As far as the price of Cambio is concerned, it is a subscription with additional costs depending on the use. You first pay a monthly subscription fee, which varies according to the type of subscription you choose. In addition, there are travel costs, which also depend on the subscription and the model of the car used. There is also a one-off activation fee of €35 regardless of the type of subscription. The price of petrol, insurance and all maintenance costs are all included. (Cambio, 2022)

Poppy

Poppy offers a free-floating car-sharing service, i.e., users find the car through their app, make the journey they want, and finish their journey wherever they want as long as the car is in the area defined by the company. Consumers do not have to return to the original location as with Cambio. The list of vehicles is quite short only including city cars. The most common being the SEAT Ibiza and the OPEL Corsa. As for parking, you can park for free in any public car park as long as it is in the right area. Poppy also has some free interparking facilities through their partnership, so you can park easily and free of charge in some areas of the city. (Poppy, 2022)

For Poppy, there is no subscription fee and no charge per kilometre as long as you do not exceed 200km per journey or per day. You have to pay 1€ to unlock the vehicle after which you will pay 0.39€/min while driving and 0.30€/min while pausing. It is also possible to pay the daily rate of €75/day. It is possible to reserve your car for free but only for 15 minutes, unlike Cambio. It is however possible to add up to 24 hours of additional reservation for 0.50€/15min. As with Cambio, you don't have to worry about the price of petrol, insurance and all the maintenance costs. (Poppy, 2022)

Miles

Miles is a newcomer to Brussels. Its special feature is the per-kilometre rate, which replaces the per-minute rate offered by other operators. Miles wants to differentiate itself by allowing users to plan their journeys by knowing the budget to be allocated. According to Miles, this system avoids the stress of counting minutes.

In October 2022, the company deployed 200 Opel Corsas in Brussels and is making them available to individuals under a free-floating system. Miles offers a per-kilometre rate of €0.98 or daily rates starting at €45 for a 50km limit. Rental is possible for up to 30 days.

For the moment, the operator has only deployed in the centre, east and south of Brussels. However, the company's ambition is to expand to the whole of Brussels and even to its periphery. (MILES, 2022; Renzonnet, 2022)

GreenMobility

At GreenMobility, all shared vehicles are electric. The company owns the vehicles and makes them available to its customers, who pay for their use. The company was recently established in Brussels and opened 4 new "hotspots" which are parking spaces reserved for GreenMobility customers. For the moment, the free-floating system proposed in Ghent and Antwerp is not yet active in Brussels. The Brussels hotspots are for the moment mainly designed to favour intercity transport. Cars can be picked up at one location and dropped off at another if they remain within the area defined by GreenMobility. Here the tariff is fixed by the minute, with a standard price of 0,35€/minute. The company provides the possibility to buy packages at advantageous rates. (GreenMobility, 2022)

When an individual wishes to share a vehicle with a regular group of users (usually friends or neighbours), it is possible to organise this by oneself. However, there are various issues to deal with, such as insurance and cost-sharing, which can be tricky and complicated. This is why few platforms are active to facilitate the creation and smooth running of car-sharing groups.

Getaround

Getaround is a platform that allows car sharing between individuals. It puts owners and renters in touch with each other. The application makes it possible to find self-service cars for a few hours or days. The vehicle must be returned to the place of departure once the rental is over. Since the cars are privately owned, all types of vehicles can be found at all rates. (Getaround, 2022)

Cozywheels

Cozywheels allows you to create a car-sharing group in your neighbourhood. The platform facilitates the sharing of a vehicle belonging to an individual. The company does not make vehicles available but facilitates sharing within groups of individuals. To this end, the company offers tools (e.g. contracts, rules of use, online calendar, cost allocation calculator, etc.).

Different types of vehicles can be shared: bicycles (electric bikes, cargo bikes), cars, and commercial vehicles. Since the vehicles are owned by individuals, the fleet consists of vehicles of all shapes and sizes. Moreover, an individual can belong to different groups in order to have access to different types of vehicles.

One of the interests of this type of car-sharing is to share the costs of the vehicle. The owner covers the costs of owning the vehicle. The other users pay for the use of the vehicle (per kilometre driven). This allows the owner to be reimbursed for part of the costs. The owners save money by recovering part of the costs of the vehicle and the users do not have to invest in a vehicle. (Cozywheels, 2022)

Wibee

The WIBEE platform also acts as a neighbourhood car-sharing facilitator. On one hand, it helps to connect car owners and users, allowing them to share a vehicle. On the other hand, it gives the possibility to share a car that belongs to the Wishare cooperative and not to a private individual. The car is then made available to the car-sharing group in the form of long-term

leasing. This shared rental system is offered to groups of 2 to 5 members. The costs of the leasing are then shared between the members of the group in proportion to the usage. The car-sharing group has to pay a fixed cost per month for the leasing (including insurance and access to the car-sharing platform). This amount is the same regardless of the number of members in the group and is to be divided between the members in proportion to usage. In addition, the consumer will have to pay per km driven.

Each vehicle is equipped with a box connected to an app, even those belonging to private individuals. This facilitates sharing thanks to a connected agenda, the geolocation of vehicles, and the electronic key that allows the vehicle to be opened and started from the app. Wibee also takes care of insurance, assistance and fuel cards. (Wibee, 2022)

Car-sharing summary table (Table 1)

| Car-sharing | | | | | |
|---|--|--|--|---|--|
| B2C | | | | Between individuals | |
| Roundtrip | One-way | | Groups | P2P | |
| | Station-based | Free-floating | | | |
| Main feature | Renting a company-owned vehicle from a specific station | Renting a company-owned vehicle from one station to another | Renting a company-owned vehicle from and to anywhere within a specific area | Sharing vehicles within a group of individuals | Private car rental between individuals |
| Vehicle ownership & maintenance responsibility | Provider | Provider | Provider | Single owner OR Ownership is shared between several individuals OR The car is owned by a cooperative | Single owner |
| Vehicle location | Provider's stations → The vehicle must be returned to the station of origin | Provider's stations → The vehicle can be returned to any of the supplier's stations | Public car parks → The vehicle can be picked up and dropped off at any public car park in the area | The owner's private car park or public car park → The vehicle must be dropped off at or near the owner's home | The owner's private car park or public car park → The vehicle must be dropped off at or near the owner's home |
| Pricing | The provider sets the prices. Cost per use (per min., per km, per day...). Subscription and activation fees may be added | The provider sets the prices. Cost per use (per min., per km, per day...). Subscription and activation fees may be added | The provider sets the prices. Cost per use (per min., per km, per day...). Subscription and activation fees may be added | Via a platform or informally. Separation of costs of ownership and use on a pro-rata basis or any other arrangement groups have | Usually via a platform. The price is set by the owner. Cost per use. |
| Type of use | Usually for longer trips within or outside a city | Usually for short trips within a city or for intercity | Usually for short trips within a city | Any type of use | Usually for longer trips within or outside a city |
| Examples | Cambio | GreenMobility | Poppy Miles | Wibee Cozywheels | Getaround |

Table 1: Car-sharing offers summary table

Car-sharing statistics

The number of car-sharing users has increased almost sevenfold over the last five years, reaching a figure of 194,000 and still rising according to autodelen.net (2022). Today, 2.5% of Belgians with a driving license already use carsharing, and the figure is much higher in Brussels, about 8%. Between 2020 and 2021, there has been an increase of more than 30% in car-sharing users and more than 20% in the number of shared cars.

However, even though the number of users and car-sharing is increasing, there are differences between the regions of Belgium. The biggest increase is in Flanders with an increase of more than 50% of users, reaching a number of 122,000 members. The second-biggest increase is in Wallonia with an increase of 24% but only 8200 users. Finally, the growth in the number of users in Brussels is lagging behind with an increase of 6% and about 63,000 users.

A good analysis can be in the number of cars as well. Indeed, the number of cars in Flanders and Brussels is proportionally equal, being 3000 cars in Flanders (representing more or less 1 car per 40 users) and 1300 cars in Brussels (representing more or less 1 car per 48 users). It is in Wallonia that we can see way fewer users per car with 400 cars (representing approximately 1 car per 20 users). (Autodelen, 2022).

As explained above, there are more than 63,000 people using car-sharing and 1,340 shared cars in the RBC, with an estimation of 8% of people with a driving license as users. But of the 63,000 users, only 34,000 were actually active in 2021.

Concerning active users, it is roundtrip car-sharing that has the most active users, with 15 772 active users out of 23 435 total users (67%) for 705 shared cars (53%). Free-floating car-sharing has 17 854 active users out of 36 552 total users (49%). There are therefore more users of free-floating car-sharing, but they are less active than roundtrip car-sharing users.

The use is also very different between the two types of car-sharing. More than 65% (280,000) of the trips were made in roundtrip car-sharing compared to the remaining 35% (150,000) in free-floating. Similarly, the average journey time is 7h45 for roundtrip compared to 30 minutes for free-floating, which is also confirmed by the distances, which are 56km per journey for roundtrip compared to 12km for free-floating. These figures suggest that roundtrip seems to be preferred for daily trips with long breaks during the trip, whereas free floating seems to be used less often, for shorter distances and for shorter periods.

CHAPTER 2: RESEARCH METHODOLOGY

General objective & choice of method

In this section, we present the research methodology and the reasoning behind it that allows us to answer the research question “*How can carsharing become a driver for consumer adoption of the functional economy in the mobility sector by the Brussels population?*”

In order to answer our research question, we decided to use an exploratory research strategy. The aim is to understand the potential for consumer adoption of car-sharing, to understand the needs, attitudes and behaviours of individuals regarding mobility and identifying the type of usage they might be interested in. To a greater extent, we hope to go beyond car-sharing and understand the potential for adoption of means of mobility perceived as more sustainable, particular attention is paid to functional mobility.

To reach this objective, we use an exploratory approach to constructing a theoretical object using an inductive mode of reasoning, which is the process of generalisation based on reasoning from the particular to the general. That is to say, we explore a complex field by studying particular cases in order to extract the important dimensions.

To carry out this exploratory research, we decided to rely on qualitative data collection. The field study will allow us to obtain qualitative data through individual and semi-structured interviews. Since the objective here is to understand the drivers of consumer adoption, it seems inevitable to discuss it with individuals (car-sharing users and non-users). This is in order to obtain profound insights into consumer attitudes towards mobility as well as to try to understand to which actual behaviour this leads to. The qualitative approach favours a meticulous and in-depth investigation. It seems appropriate for understanding the nature of the forces that may operate on the consumer' adoption, acceptance and receptiveness, such as the barriers and motivations to car-sharing.

Field and sample selection

We made the choice to focus our analysis on the Brussels region. Indeed, studying mobility and car-sharing in an urban or rural environment would probably lead to rather different conclusions, which is why the two situations should be studied separately. We chose the city of Brussels mainly because we wanted a city where alternative modes of transport to the private car were already developed. We wanted to limit all logistical constraints. It is obviously more complicated to implement a car-sharing PSS and to create a multimodal network in a non-urban environment. Although this is a very interesting discussion that could be the subject of future research, it is not our objective here. In this thesis, we seek to understand what could influence the consumer in an environment where the system is already at least partly viable.

Brussels already has several car-sharing companies operating within it. In addition, the number of users and the fleet of vehicles are growing every year. However, as seen in the “Car-sharing statistics”, growth is rather slow despite the promising expectations of operators and authorities.

As far as the choice of our sample is concerned, our objective with this data collection is to be representative of different types of consumers of the Brussels population. We therefore decide to use 4 main categories: car owner (or not), car-sharing user (or not), profession (independent, worker, employee, student, not working), and cohabitation status (living alone, with partner, with family, with roommates). The goal is to try to cover as many patterns of use as possible in terms of mobility. That is why we are looking for the most heterogeneous sample possible, bringing together carsharing users and non-users in order to get the most diversified and complete responses possible.

We do not focus on internal Brussels mobility but on the overall mobility of the inhabitants of Brussels. The reason is simple; we are looking to understand how people are willing to change their mobility as a whole and not just for their regular mobility such as the work-home journey.

For obvious reasons, we are interested in Brussels residents with a driving licence. Although to go further, one could ask whether the Brussels consumer no longer feels the need to get a driving licence because his mobility needs are already met.

However, we are aware of the biases, with so few categories and therefore profiles, it is not possible to represent all types of profiles and all usage patterns. Moreover, 50% of interviewees were users or former users. This is not representative of the Brussels population where only

around 8% already used car-sharing systems. Interviewing so many users was however a voluntary choice. They have already really asked themselves about their barriers and motivations, they have informed themselves about the different solutions and know the reality of the field. The discussion can go deeper than the initial obstacles that tend to demotivate non-users. Finally, as the company car is also predominant in the Belgian culture, we could not pretend that it does not exist. That is why we interviewed two persons having a company car, even if he or she will probably not become a car-sharing user in the short term.

To choose the people to interview, we therefore searched for people using car-sharing via the different social medias, thinking that it would be the most difficult people to find. After that, we were able to see which kind of profiles we were filling to search for people with different profiles. The goal was at the end to have all the attributes of the different categories represented at least once. The final list of participants and their main characteristics are listed in table 2.

| Name, age | Car-sharing users? | Car owner or company car? | Professional status? | Cohabitation status? | Commune? |
|------------------|---|---|--|--|---------------------|
| Aurélie, 25 | Non-user, already considered it | Yes, has a company car | Employee, HR consultant, has missions at different places in Belgium | Shared flat with 5 roommates | Woluwé Saint Pierre |
| Charly, ~30 | Former user, used DriveNow ~1x/week, almost never use it anymore | Yes, owns a sport car and has access to shared company cars | Launched a start-up, has regular business meetings | Shared flat with 2 roommates | Woluwé Saint Pierre |
| Sylvain, ~31 | User of Cambio for work mainly and sometimes privately | No, only use Cambio, car of parents or bike | Employee in a company consulting building's sustainability | Shared flat with 4 roommates | Auderghem |
| Anne, 57 | User of Cambio to go outside Brussels by night or for big grocery | No, had one but sold it, bike user | Nurse in hospitals in Brussels | Living alone | Schaerbeek |
| Alice, 40 | User, Cambio, 1-2/month | No, neither her nor her partner has a car | Employee, work for Brussel environment | Live with her partner | Evere |
| Magali, 34 | User, borrow her parents' car. Uses Cambio as a plan B about 1x/month | No, neither her nor her partner has a car | Inability to work | Live with her partner + expects a baby | Schaerbeek |

| | | | | | |
|---------------------------------|--|---|--|---|----------------------|
| Perrine, 21 | Non-user, never considered it | No, only use public transport and walk, sometimes go with her boyfriend by car | Student in journalism, moving around Brussels to make reports | Shared flat with 3 roommates | Uccle |
| Philippe, 50 | User, Informal car-sharing with neighbours 2x/month + Cambio & Poppy: 1x/month | No, neither him nor his wife has a car | Freelancer + higher education teacher | Family: wife and 3 children | Watermael Boitsfort |
| Olivier, 55 | Non-user, never considered it | Yes, Their wife owns a private car and he has a company car | Employee, sales, has regular business meetings | Family: wife and 4 children, only 2 of them still leave at his home | Watermael-Boitsfort |
| Laurent, 35 | User, Poppy 2-3x/month | No, BUT wife has a company car, and he has a scooter | Employee A math teacher in secondary school | Family: wife and 2 children | Ixelles |
| Muriel, 55 | Non-user, never considered it | Yes, 2 cars for the family (4 people) | Police officer, HR and planning manager | Family, with 2 boys and the husband | Watermael-Boitsfort |
| Anonymous loan name = Paul , 63 | Non-user, never considered it | Yes, 1 car, half of it in company costs | Independent in jewellery | Family, with one boy and the wife | Watermael-Boitsfort |
| Ana, 27 | User of Cambio and Poppy, mostly Poppy | No car, but live with the boyfriend who has the car of the parents | Independent in music, making concerts all over Belgium in orchestras | Living with the boyfriend | St-Gilles |
| Juliette, 22 | Non-user, never considered it | Yes, shares a car with her brother but not in Brussels | Student | Shared flat with 6 roommates | Woluwe-Saint-Lambert |
| Vincent, 23 | Non-user, never considered it | No, borrowing the parent's ones when needed and using public transport and bike otherwise | Student | Family: living with the parents | Etterbeek |
| Victor, 23 | Non-user, did consider it | Yes, one car and 2 vans for work | Carpenter and completion worker | Family: living with the parents | Auderghem |

Table 2: Summary table of respondents and their profiles

Data collection & analysis

In concrete terms, data collection consisted of an initial online questionnaire collecting the first quantitative data in order to determine the consumer profile (Appendix 3). This was then followed by qualitative data research. The data is acquired through one-to-one interviews with individuals. The interviews will be guided by a semi-structured interview guide (Appendix 1) to be able to compare the different interviews while keeping certain flexibility. This allows us to better understand the needs and attitudes of the consumer regarding car-sharing or functional mobility, as well as to understand their "states of mind" regarding ownership, sharing and sustainability. The semi-structured interview will help us to keep a similar structure between participants facilitating the comparison of data while keeping the flexibility to adapt to the interview and to dig deeper into relevant topics with certain individuals. Interview transcripts can be found in Appendix 2.

However, we are aware that by collecting data in this way, we have mainly collected consumers' attitudes and intentions and less their actual behaviour, which is something we need to keep an eye on.

Different scholars talk about different methods to analyse qualitative data. However, most distinguish the same 3 consecutive steps. First of all, the researcher starts by carrying out a pre-analysis or data organisation step. Next, the coding process is carried out, which consists of breaking down the content into units of analysis (words, segments, etc.) and classifying it into different categories. It then remains to interpret the results. (Thiéart, 2007) (Wanlin, 2007)

Coding is therefore divided into a first stage of de-structuring and decontextualization of data, "*taking an extract of the text out of its context in order to make it semantically independent in order to create categories or themes*" (Krief & Zardet, 2013, p.228) followed by a restructuring and recontextualization phase, "*amalgamating the decontextualised categories to make an intelligible and meaningful whole*" (Krief & Zardet, 2013, p.228) (Tesch, 1990). (Averseng, 2011). To facilitate this coding process and the decontextualization-recontextualization of data, we used Nvivo software, which enabled us to construct a dictionary of themes more quickly.

Objectives of the fieldwork

The objective of the fieldwork is to understand the potential for consumer adoption of car-sharing and to determine the role that car-sharing could play in the substitution of private car by a range of other functional alternatives.

In order to answer these questions, we divide our fieldwork into different sub-objectives:

- Understanding consumers' mobility needs and usage patterns.
- Understanding consumers' barriers, motivations and expectations. Understanding both rational and emotional factors.
- Understanding the consumer decision-making process related to the adoption of perceived sustainable mobility, in particular car-sharing.
- Assessing the impact of perceived sustainability as a factor in the adoption of transport modes.
- Assessing the receptiveness and acceptance of consumers to functional consumption (ownerless, sharing, ...).
- Understanding the relationship between consumers and private cars (substitution, addition, limited use...) Understanding what the consumer would need to fully substitute his private car with other means of mobility.

CHAPTER 3: RESULTS

In the results, acronyms have been used next to each name to help understand which profile it is. We want to highlight the fact that only the profile of car owner or not has been chosen, firstly for the sake of clarity, and secondly because this is the attribute that emerged as the most impactful in the interviews. Moreover, the aim is to replace the private car-based model with a functionally designed mobility model, and whether the individual owns a car or not is therefore crucial. “O” will therefore be used when it is a car owner and “N” will be used when it is a non-owner. Individuals with a company car are counted as “O”. Although this is not technically correct, the feelings and perceptions are very close to those experienced by car owners.

Consumers’ use patterns and needs

In this section, we list the main elements mentioned by the participants that they believe influence their mobility and choice of transport means. As a first step, we have therefore tried to identify and understand the different travel needs and the different consumer profiles.

Family situation

A factor frequently cited by participants is family situation. Indeed, decisions to own a vehicle seem to be made, for example, according to the number of children and their age. Moreover, mobility sometimes seems to be considered within the household and not individually.

Impact of children

The consumer's perceived need for a personal car seems to increase when they have children. The perceived need for the size of the car also increases. Laurent (N) states: *“What is clear is that if we didn't have a company car for the household, we would need one. It's impossible with children to live without a car because we travel quite a lot or even to go to see the family.”*

Olivier (O), who has 4 children, had long chosen to take a 7-seater car for this reason. Nowadays, only two children live with him, which has reduced the size of the car chosen. For the same reason, Muriel (O) has always chosen large cars to ensure that everyone has enough legroom in the back seats and can still carry enough stuff.

Even Magali (N), who has never owned a car in her life and is expecting a child, is beginning to have doubts: *“Now that we expect a child, I don't really know where it will lead us. We'd like to do without a car. But we have friends all around us who have changed sides after the arrival*

of a child. In principle, we are organising ourselves so that we can do without.” Ana (N) also express that she would think about having a car if she had a baby in the future.

Among the interviewees, Philippe (N) belongs to the only household with children that does not own a car. He explains that it is perfectly possible to do without one. *“As far as mobility is concerned, we ride an electric bike, especially my wife, which we use on the metro, in the bus or in the shared car. I have a thermal scooter. Our children all have bikes. And then we use public transport, Cambio, Uber... There are quite a few solutions.”* On the other hand, Philippe (N) thinks that when the eldest child has to get a driving licence, they will consider taking a car.

Household organization

The interviews show that mobility seems to be thought out for the household. This is particularly true when it comes to vehicle ownership. The number of vehicles owned as well as the type of vehicle seem to be thought out mainly for the overall needs of the household and not individually for each member. (Muriel (O), Laurent (N), Olivier (O), Alice (N), Magali (N), Philippe (N), Vincent (N))

Laurent (N) tells us that taking a second car for the household is not necessary. He has a scooter, and his wife has a car which they use for weekend outings. However, he points out that having a car for the household is non-negotiable.

Muriel (O) says: *“We have two cars for the household, they are not especially in the name of one or the other, we really share the two cars and we share them with the whole household, i.e. it's mainly my husband and I who use the cars, but the two boys also use the car when they need it from time to time.”*

Olivier (O), who has a company car, told us that this had an impact on the choice of the household's second car, which is a small city car that does very few kilometres

In the case of shared accommodation, on the other hand, mobility does not seem to have been thought through together. (Aurélie (O), Charly (O), Juliette (O), Perrine (N), Sylvain (N)) Aurélie (O), Perrine (N) or Sylvain (N), who live with several flatmates, have never used their car. Charly (O) has already used his flatmate's car once or twice, but in any case, he does not decide on his mobility based on this.

Jobs

The vast majority of participants cite work as their main reason for mobility. For this daily trip, consumers adopt different types of mobility.

Work-home travel

Public transport and soft mobility seem to be rather usual means for the Brussels population when they go to work. Whether by bike, electric bike, tram, metro, etc. (Juliette (O), Vincent (N), Alice (N), Philippe (N), Perrine (N), Muriel (O), Anne (N)) Philippe (N), who is a regular user of car-sharing, tells us that he's never commuting to work by car.

However, other interviewees use, occasionally or regularly, the car for this daily trip. Every time Olivier (O) has to go to his workplace, he takes the car. Victor (O) finds his car necessary to get to work. *“Work is not possible by public transport; it would take me three times as long as by car and it's not possible for me to waste so much time. I could do it by bike, but it's difficult because it's 15 km to go to the workshop and I'd come back in the rain and cold... So, it's feasible, but difficult.”*

Sylvain (N) uses car-sharing 4 times a week to get to his workplace. He works in an area that is not easily accessible by public transport, so his company offers to reimburse car-sharing costs to employees without a car.

Paul (O) also uses his car to get to work, but he does so due to several factors, such as the necessary security for his work as a jeweller, the need for mobility following an accident that immobilised him for many months, and also for comfort when he wants to go to specific places after work.

Laurent (N) goes to work every day on his scooter, sometimes by bike when the weather is good. He considers the scooter to be the most efficient way of getting around Brussels, especially during rush hour.

Other participants indicate that they generally try to get to work by other means, but there are incentivised to take the car from time to time (e.g., time-saving, weather, sequence of activities, ...). (Aurélie (O), Muriel (O)) For example, Muriel (O), although she mainly uses a bicycle, sometimes uses the car when the weather is bad or when she has to go to an appointment just after work in a place that is not always easily accessible by bicycle.

Business travels

Regular business travel seems to greatly increase the perceived need to own a car. Of the five people who have to travel for work reasons, excluding the work-home journey, all perceive the car as indispensable. (Ana (N), Charly (O), Olivier (O), Paul (O), Victor (O))

Ana (N), Charly (O) and Olivier (O) all say that they need a car to be able to go to several meetings in one day. As they sometimes have to travel from one city to another, they consider the car to be indispensable, especially when travelling outside Brussels. Since their trips are very variable, the car allows them to adapt easily and to go everywhere without losing too much time. Charly (O) explains that he has to be presentable when he arrives at his appointments. If it's raining and he has to walk in the rain to get to public transport, that's not possible. He can't take his bike and arrive in a sweaty state either.

Ana (N) often has to travel between Brussels and Antwerp and other cities in Flanders, so during the rush hour she tends to choose the train. But she also works during weekends, in which case she favours car-sharing.

Paul (O) explains that in his risky job, he sometimes has to transport diamonds. Having a big car helps him to feel safer. In addition, he needs to have a vehicle available at all times. *"I just can't afford to have a lack of availability if now someone says to me "I have 2 diamonds here to sell, could you come and analyse them?" and I say I don't have a car because I'm doing car-sharing; One, I lose the sale and the analysis and, two, I lose all credibility. So, it's just not conceivable."*

Finally, Victor (O) needs his van to transport the various furniture and equipment he needs on the different sites he has. He also sometimes uses his private car for various business purchases when he cannot take the van or when the purchase does not require a large volume and it is therefore simpler and more cost-effective to take his car.

On the other hand, when Olivier (O) has to travel abroad to meet customers, he will choose options such as the train or the plane, which are faster and more efficient.

Leisure time

Just below work, the most common reason for travelling mentioned by the participants is everything that could be classified as “*leisure time*”; going to see family or friends, doing cultural activities or sports, or any other leisure activities.

However, although this is an important reason for travelling, when participants justify the means of transport used to go to their activities, it seems to depend rather on the other factors (family, location, schedule, etc.). For example, when Laurent (N) goes to the park with his children, he takes his wife’s car because he doesn’t want to spend too much time on public transport with them. When Juliette (O) goes to see a friend in Brussels, she goes by public transport but for an activity outside Brussels, she will tend to go by train or car. Finally, when Paul (O) wants to go hunting, he prefers to have his car because it can go everywhere easily, in the mud or on stones and rocks.

Holidays and occasional trips

Among the candidates, all car owners but Charly (O) mentioned holidays as one of the motivations for choosing their car. They justify the need to own a car for when they go on holiday or exceptional journeys. Most said they chose larger cars to fit the whole family and luggage. (Muriel (O), Laurent (N), Olivier (O), Juliette (O), Victor (O), Paul (O))

Muriel (O) says: “*For holidays we are always at least 2 or 4 with all the luggage so we need space.*” Juliette (O) and Victor (O) admit that their first reflex for unusual trips such as holidays or weekends is to take the car. For occasional trips, Victor (O) admits to using his car 9 times out of 10. For Laurent (N), having a car to go on holiday is a given.

For non-car owners, these exceptional occasions are also often journeys for which the car remains the main option. For Philippe (N), what prevents him today from ceasing to use the car entirely are “*occasions like weekends or holidays. In our daily lives, we replace almost 100% of car use.*”

Magali (N) and her partner recognise that in unusual situations the car allows them greater freedom. Therefore, they tend to borrow their parent’s car or, when this is not possible, to rent a car.

Ana (N) uses a car to go to the airport when she goes home to Portugal. She takes a Poppy car, which is very convenient because she can leave it in a special car park and can easily get another one when she returns to Belgium. She finds this more convenient than public transports which she believes are often unreliable, which can be stressful when you have to fly.

In contrast, Aurélie (O), even though she has a company car, will tend to look for other alternatives. *“For comfort or even price, I might decide to go by car... but I have many other options. The car is not indispensable.”*

Grocery shopping and other transport of objects

Grocery shopping is one of the most frequently cited reasons for travelling. In our interviews, non-car owners often explain that they do big shopping trips once or twice a month, for example by using car-sharing services or by borrowing a car from friends or family. Apart from that, their small errands tend to be done on foot or by bike. (Alice (N), Magali (N), Philippe (N), Anne (N), Ana (N)) Alice (N), who is a car-sharing user, says: *“We'd rather combine the grocery shopping if we used the car for something else.”*

Among car owners, the answers are more divided. Some seem to take the car for each of their errands, others favour walking or cycling except for very large errands.

For the transport of bulky items that are infrequent trips, the car seems to be considered the number one means of transport (Sylvain (N), Muriel (O), Laurent (N), Vincent (N), Magali (N), Olivier (O)) Muriel (O), who has a country house, says that she sometimes needs to transport material for gardening or cleaning. Vincent (N) mentions the times he has to go to the waste disposal centre. Laurent (N), who usually travels to work on a scooter, said that he sometimes takes the car on days when he has to transport materials. Moving in was also mentioned in the interviews. Magali (N) has a cart to pull behind her bike for her daily routine, and for anything that doesn't fit in it, she prefers the car. Olivier (O) occasionally rents vans for those rare cases when he needs to transport bulky items.

Travel location and time

Two elements that have an impact on the choice of means of transport are

- The location: if the destination is well served, if it is far away, etc.
- The time of day: at night, during rush hour, in the middle of the day, etc.

Alice (N), who does not own a private car, says: *“In fact, it is mainly questions of timetables and accessibility that make us use the Cambio instead of public transport”*

Within Brussels

For travel within Brussels, a majority of participants say they regularly use public transport or soft mobility. They find that these means of transport suit their needs as long as they stay in Brussels (Alice (N), Magali (N), Sylvain (N), Juliette (O), Aurélie (O), Vincent (N), Ana (N), Philippe (N), Perrine (N), Anne (N)). For example, Alice (N), Anne (N), Sylvain (N) and Magali (N) do almost all their travelling by bicycle.

However, Olivier (O) still prefers to use his car on a daily basis to get to his workplace. And for Laurent (N), the best way to get around Brussels is by scooter. It provides all the freedom of a car while being very efficient and cost-effective.

When it comes to going out in the evening, Alice (N), Laurent (N), Charly (O) and Sylvain (N) tend to favour the use of public transport or a shared car (which they can drop off without having to come and pick it up) to get there and take a taxi or Uber on the way back.

Outside Brussels

Participants seem to find places outside Brussels quite frequently inaccessible by public transport. It was often mentioned that these areas outside Brussels are generally poorly served and when transport exists, it tends to stop too early.

Aurélie (O) and Alice (N) both gave the example of Louvain-la-Neuve which is no longer accessible by train after 10 pm. Anne (N), who tries to travel mainly by train outside Brussels, encounters the same problem, so she sometimes has to fall back on shared cars.

Charly (O) says: *“When I have clients to see outside Brussels, where there are very poor connections, I can't do without the car.”* And Magali (N) says: *“If we want to go out of Brussels*

for the weekend, for example, and it's not easy by train, we'll take my parent's car. Or to go to my grandparents who live outside Brussels for an afternoon. Taking the car is easier. And then we have a Cambio subscription that we use for the same reasons, i.e. going outside Brussels that is not easily accessible by train."

Muriel (O) also expressed that train stations are not always near the place she needs to go. She is therefore often forced to take the car because she would be blocked once arrived at the station of the city.

As a result, outside Brussels, it is still the car that seems to be the most convincing, whether it is a private car or a shared car. It is even perceived as necessary by most consumers to meet their needs (Sylvain (N), Juliette (O), Charly (O), Anne (N), Alice (N), Magali (N), Philippe (N), Olivier (O), Laurent (N), Victor (O), Vincent (N), Aurélie (O), Muriel (O)).

A summary table (Table 3) is available just below.

Consumers' use patterns and needs summary table

| Factors | Sub-factors | Perceived needs |
|------------------------------|------------------|--|
| Family | Children | <ul style="list-style-type: none"> The consumer's perceived need for a personal car seems to increase when they have children Children are also a motivation to get larger cars |
| | Household | <ul style="list-style-type: none"> The number and types of vehicles owned seem to be thought out mainly for the overall needs of the household and not individually for each member. When it is a matter of flatmates and not a family, mobility is thought out individually |
| Jobs | Work-home | <ul style="list-style-type: none"> Most frequent trip for many individuals This regular journey is divided between those who go by public transport, soft mobility and car depending on factors such as location and schedule |
| | Business travels | <ul style="list-style-type: none"> Having regular business travel seems to greatly increase the perceived need to own a car. To go to several consecutive meetings, to arrive in a presentable manner, to transport equipment... |
| Leisure time | | <ul style="list-style-type: none"> One of the main motives for travel, combining regular and occasional trips When participants justify the means of transport used to go to their activities, it seems to depend rather on the other factors (family, location, schedule, etc.) |
| Holiday and occasional trips | | <ul style="list-style-type: none"> Car perceived as bringing freedom for exceptional journeys For car owners, it is an incentive to ownership. A larger car may even be chosen to accommodate these occasional trips Among non-owners, the car is also seen as the means of travel for unusual trips, so they will often tend to rent a car |
| Shopping | Small errands | <ul style="list-style-type: none"> Non-owners do it on foot, by bike or by transport Owners are divided between those who favour more sustainable means and those who favour the convenience of the car |
| | Bulky items | <ul style="list-style-type: none"> For transporting bulky objects, the car is seen as indispensable by owners and non-owners |
| Travel location and time | Within Brussels | <ul style="list-style-type: none"> For travel within Brussels, a majority of participants say they regularly use public transport or soft mobility. They find that these means of transport suit their needs as long as they stay in Brussels For few others, the car remains the one mean of travel, even in the city. |
| | Outside Brussels | <ul style="list-style-type: none"> Participants seem to find places outside Brussels quite frequently inaccessible by public transport. These areas outside Brussels are too poorly served and when transport does exist, it stops too early. The car is still perceived as the means of travel that meets the needs outside the urban environment. |

Table 3: Consumers' use patterns and needs summary

Consumers' perceptions of mobility modes

The aim is now to understand how the inhabitants of Brussels perceive the different transport possibilities offered to them and to understand what they consider the advantages and disadvantages of these are.

Private car

Motivations

The advantages that were most cited among the 16 interviews were autonomy, flexibility, freedom, the indispensable nature of the car and comfort.

Regarding **flexibility and freedom**, indeed, many interviewees explained that having their own car allowed them to do what they wanted, when they wanted and where they wanted (Aurélie (O), Muriel (O), Vincent (N)). Philippe (N) expressed a “feeling of freedom” about owning a private car. Laurent (N) adds that having a large car for the household allows him to be prepared for certain eventualities and therefore offers him certain flexibility in certain rare cases. Paul (O) also said that, with his disability he already has a huge loss of autonomy and does not want to lose any more by waiting for trams, buses, or car availability.

Almost all the interviewees with a private car expressed the fact that it was however surely possible to find other solutions but that they preferred to keep the **comfort** of the private car for the reasons mentioned above. Indeed, the interviewees were not only talking about physical comfort, such as being warm, which Aurélie (O) likes, or having comfortable seats, as Muriel (O) and Victor (O) explain, but about a general comfort of life in their means of mobility. This is an omnipresent aspect taken from the interviews.

Another advantage is the **proximity** of your own car. Laurent (N) and Olivier (O) find the private car very advantageous in the sense that the car is right in front of your house and that it is much more pleasant than other transport. Aurélie (O) also explained that she liked having the car right in front of her house.

The private car is also seen as indispensable by the interviewees to meet their mobility needs for several reasons.

A first reason why the car is essential is the importance it plays at a **professional level** as explained in the results. The car seems to have too much importance for people having lots of

variable travels to do and busy and tight schedules. Moreover, some people need safety or also credibility because of their job and public transports are therefore not an option for them.

Still about the motivations, owning a car when **having children** seems to be mandatory for the interviewees and this factor has to be taken into account as a motivation to buy a car.

An additional reason is **disability situations**. Alice (N) and Anne (N) explain that in certain situations "*the car is necessary in households with a person with a disability*". Paul (O), himself a person with reduced mobility, explains that getting on public transport is very difficult and that cycling is almost impossible in his situation. His car is high enough and adjusted for him, so he has a viable means of travel.

One of the advantages mentioned is also the fact that the personal car can be **multifunctional**. Paul (O) explains that he hunts and needs a vehicle that can go anywhere in the forest and still have a vehicle that is practical for the city and pretty, so his personal car suits him perfectly.

Finally, an advantage cited by some people is also the **price**. Indeed, Muriel (O), Victor (O), and Paul (O) all agree that the car is extremely expensive. However, all 3 also think that, in view of their use, the car is probably the cheapest way to travel on a yearly basis. "*I would say that if you use a car a lot, it is better to have your own*", says Muriel (O), while Victor (O) says that "*the individual car is very expensive, but it is one of the cheapest means of transport if you travel a lot and often and that you need a car*". Moreover, Paul (O) is independent and can therefore put half of the costs as company expenses, reducing the total costs of the car and it probably has an impact on his perception.

Some of the benefits mentioned by participants are attributable to the car in general and are therefore fully valid for the shared car. This is the case for the two following motivations. It is going to be taken into account for the analysis but won't be expressed again in the part of car-sharing in order to avoid overloading the thesis with repetition.

The car is considered the best way to travel outside Brussels and the major cities, as other means of mobility do not seem sufficient. The car **guarantees access to any destination**, even remote ones. Indeed, Muriel (O) said, "*from my point of view, when I go out of Brussels, the car is indispensable*".

Another reason is simply the **time saved** by the car for all kinds of journeys. Victor (O), Muriel (O), Laurent (N), Vincent (N), and Juliette (O) all 5 affirm that the car is the fastest means of transport in many cases. Laurent (N) explains that "*depending on where you are located, the*

car is faster than the STIB", while Muriel (O) explains that to go to the countryside by train, it takes 3 hours against 45 minutes by car. Victor (O) said that the distance between his home and his workshop was 15 kilometres and that it took him 1.5 hours to get there by public transport as opposed to 30 minutes by car and that, given his schedule, he did not want to take three times as long to get to work or to get home.

Finally, this situation opens the discussion about the **company cars**, that is going to be treated in this section, which is the closest to this type of transport, being actually a personal car which bigger benefits for the consumers. Indeed, company cars have many benefits, as it is perceived by the owners as something free (Charly (O), Olivier (O)). In addition, people also mention the fact that they don't have responsibilities, since everything is managed by the company, which is very comfortable (Vincent (N), Laurent (N)).

Barriers

With regard to barriers, respondents highlighted some common disadvantages. The ones that come up the most are cost, liability and parking problems.

In terms of **cost**, almost all interviewees were very clear that a car is extremely expensive. "*You have to look at the total price of the private car, the purchase, parking, maintenance, insurance, petrol*", explains Alice (N), who states that she does not want a car even in the future. The other interviewees also agree, explaining that in addition to the purchase, it is all the other costs that need to be taken into account. Sylvain (N) explained that a friend of him had to change his car's horn and had to pay 800 euros, which he found absurd when he saw all he could do with those 800 euros. Laurent (N) also added the cost of changing tyres to the costs already mentioned to show that it was a financial drain.

In addition to these costs, many of the interviewees also explained that a car brings **a lot of responsibility**. Alice (N) explained that she would mind having to take it to the technical inspection, deal with the insurance, maintain it and clean it properly. "*The other day I had my backlight on, I couldn't turn it off, I had to go to forums etc.*" explains Aurélie (O) who finds the car an additional stress. Sylvain (N) and Magali (N) have the same feeling of stress about owning a car. He finds that having to be careful with his car, to be sure that nothing is in the car and to be afraid of having his car stolen or broken into is a real lack of comfort while she explains that "*there is a form of responsibility which, by the fact of owning a car, does not suit*

me and which stresses me". Ana (N) even compares the car to "*another living being*" both in terms of cost and responsibility.

Furthermore, **parking spaces** are a huge disadvantage for many of the interviewees. Magali (N) and Anne (N) live in Schaerbeek and are both convinced that having a car in this municipality is totally surreal. "*When I had a car, I would sometimes drive for an hour to find a parking space and I would see 3 or 4 other people doing exactly what I was doing*" explains Anne (N), who no longer has a car and is very happy. Laurent (N), Sylvain (N) and Vincent (N) also agree that parking in Brussels is very difficult and therefore not practical. Aurélie (O) even adds that, for most parking spaces, you have to make a parallel park and that she hates that.

Some interviewees, such as Muriel (O) and Vincent (N), also expressed the fact that driving in Brussels was **difficult and stressful** because of the traffic jams and the aggressiveness of others. Vincent (N) therefore rarely decides to drive a car in Brussels.

Ecological impact was also mentioned as a disadvantage of the private car. Indeed, Magali (N) mentions not having a private car because cars pollute and are not good for the planet. This disadvantage did not appear first among the other interviewees. Few people explained that they did not own or use cars because it polluted. However, ecology was indirectly referred to several times as a barrier to car ownership by being cited instead as a motivation for other means of transport, as we will see later.

Public transports and soft mobility

Motivations

The main argument used by people using multimodal options based on public transports and soft mobility solutions is **time**. Not only the time saved but also the time available to do other things. Alice (N), Vincent (N) and Anne (N) all use bicycles and believe that they are the fastest means of transport in Brussels without any doubt. Muriel (O) takes the same amount of time by bike as she does by car, which also suits her quite well, unlike public transport. Paul (O), for his part, believes that some journeys in Brussels are much more efficient by public transport than by car. He explained that to go to Louise Avenue, he saved more time by taking a tram near his home for 15 minutes than by taking a car for 15 minutes in traffic and having to find a parking space and pay. In addition to the time saved, interviewees strongly emphasised that time on public transport was also beneficial for doing other things. "*The other day, I was on the same train for 20 minutes, so I used it as my office, I sent emails etc.*" explains Aurélie (O) who takes advantage of her journeys to work, as does Charly (O). Alice (N), Anne (N) and Juliette (N) use it to relax, listen to music, read a book, talk to their friends, which they couldn't do in a car or by bike. Laurent (N) also explains that his colleagues enjoy this time to watch a series and rest: "*they are relaxed... in the end, it is their meditation*".

This brings us to another advantage put forward in the interviews, **stress reduction**. As mentioned before, owning a car can be stressful for some people and taking public transport or cycling, therefore, reduces their stress, as for Ana (N) or Sylvain (N). Others, such as Vincent (N) and Aurélie (O), also highlighted the stress of driving in Brussels. Aurélie (O) explained that in the morning at 8 am, she is not always very awake and that she finds it stressful to drive in Brussels, so she prefers to spend her time on the tram to wake up at her ease and not think about anything. Vincent (N) pointed out the aggressiveness of the drivers who can be very stressful and irritating. Perrine (N) also added that driving in Brussels would stress her out too much and that in public transport she does not ask herself questions and finds it more pleasant.

Another motivation for using multimodality is **price**. Even if some people find the cost of public transport exaggerated, others find multimodal options much cheaper. Perrine (N), Vincent (N) and Juliette (O) point out that the STIB subscription for young people at 12 euros per year is absolutely unbeatable in terms of cost. They find this offer very interesting and that there are no other alternatives as cheap. Sylvain (N) and Anne (N), on the other hand, emphasised the fact that the bike costs almost nothing after purchase, explaining that you have

to do some maintenance every year but that, apart from the purchase, the bike is much cheaper than transport, bearing in mind that they no longer have access to the offer of 12 euros per year.

Among the participants, 12 mentioned **ecology and sustainability** at one time or another as a factor motivating their consumption in terms of mobility. Several candidates think about their daily mobility for environmental reasons (taking public transport, reducing their use of the car, etc.) (Alice (N), Aurélie (O), Ana (N), Anne (N), Magali (N), Philippe (N), Juliette (O)) For Anne (N) it is even the number one criterion, well before price. Magali (N) specifies that a balance must be found between the different factors: *“It's a good motivation, it's a principle that we try to follow. It is balanced with a bit of comfort so as not to reach exhaustion in terms of effort.”* Other users mention it as a secondary factor. They are happy that their behaviour has a low ecological impact, but they recognise that this will not be a sufficient factor to motivate them to more sustainable consumption, they need other additional reasons. (Muriel (O), Paul (O), Perrine (N), Vincent (N), Laurent (N), Olivier (O))

“Above all else, the environmental aspect comes first”, explains Anne (N) when asked what factors she looks for when choosing a means of transport. Others like Magali (N), Juliette (O) or Muriel (O) explain that it plays a role in their decision, that it is a plus and that it is indeed more motivating, without putting it as the number one motivation. Sylvain (N) is a little less categorical, explaining that he chooses the bicycle because it is ecological but also because it is cheaper and that he does not know how he would act if this were not the case.

A final motivation given by Muriel (O) and Magali (N) is that soft mobility, in their case cycling, allows them to be **physically active**.

Barriers

The interviewees cited a multitude of barriers to the use of public transport or soft mobility options. The barrier that was most frequently cited by a large majority was the **lack of alternatives and the lack of public transport offers**. This is mentioned both within and outside Brussels, although the lack of alternatives outside Brussels is much more emphasised by the various interviewees.

Indeed, Alice (N), Anne (N) and Aurélie (O) explain that they often go to Louvain-la-Neuve to visit friends or family. The problem is that the last train back to Brussels is at 10.30 pm, which does not suit any of them. So, they have to find other solutions and the solution most

often used is the car. Muriel (O) also talks about this disadvantage, explaining that the trains do not run late enough and that there is therefore no possibility of having an evening out outside Brussels without a car, especially as not everyone lives next to a station and there is, therefore, no possibility of getting from the station to the friends' house, explains Vincent (N). Charly (O) explains that his office is right on the border of Brussels and that there is hardly any public transport, so he has to decide between a 20-minute drive or an hour-and-a-half of public transport, which doesn't suit him either. Vincent (N) explained that there was always the possibility of travelling by bike but that it was important to be reasonable and that biking 3 hours with a lot of altitude difference was objectively not achievable in comparison with a car. The problem of holidays was also discussed. Muriel (O) explained that she likes to travel and visit a lot of places, which is much easier by car, or even compulsory. Finally, Alice (N) also spoke about the fact that some people are working at night and that they don't have other possibilities than to go by car.

The problems of the lack of alternatives in Brussels are quite similar, although much less highlighted. The main point is that public transport in Brussels does not always run late enough, and some areas are difficult to reach. Victor (O) explains that it takes a long time to get from one part of Brussels to another, whereas in other cities it is more efficient, and he does not understand why transport is not better managed. Vincent (N) explained that the bus line to the sports centre only has one bus per hour, which seems totally unthinkable to him.

These problems of lack of public transport offers underline certain disadvantages that the interviewees find highly impacting, such as **loss of time and unreliability**. Indeed, some people feel that to go outside Brussels, even within Brussels in some cases, they lose a lot of time with public transport. (Anne (N), Laurent (N), Perrine (N), Muriel (O), Charly (O), Victor (O) and Vincent (N)) Muriel (O) explains that to go to the Ardennes, it takes 3h by train with 2 connections while it only takes 45 minutes by car. Charly (O) explained that in London, transport is faster than the car, which is not the case in Belgium, and that he would therefore lose efficiency by taking public transport, given that he has many appointments to make, it is not an option. Anne (N) explained that, as soon as you have to make a connection, the waiting time is far too long and that you are therefore faster by bike. Another problem identified by Muriel (O) and Ana (N) is the lack of reliability. Ana (N) thinks that the transport system, especially the trains, are always late and that it is totally scandalous that you cannot trust these means of transport.

Another problem raised by Anne (N) is the **lack of secure parking for bicycles**. She explained that all the car parks are always crowded and that you end up tying your bike to a pole and then finding it on the ground. Muriel (O) does not ride her bike in places where there is no secure parking either, as she is afraid of having it stolen.

Other disadvantages were also cited, such as **exposure to the weather**. Belgium, being a country where it often rains and where it can be cold. Muriel (O) explained that when the weather is bad, she would prefer the car to the bike, as did Laurent (N) who felt he could be lazy when it rained and could more easily travel by car.

Some people also pointed out that the **prices** of public transport were also very high in comparison to the offer. Muriel (O) highlighted the price of trains, both single tickets and subscriptions, which she felt was excessive given the frequent problems of delays and cancellations. Magali (N) agreed, saying that it was frustrating that trains were so expensive for holidays. Laurent (N) told that renting a car is often cheaper than buying several different tickets. Finally, Victor (O) thinks that the STIB's annual pass is too expensive and that they should make an effort on the price.

Expectations

However, many expectations and improvements were requested by respondents, both those who use these means of transport frequently and those who hardly ever use them.

The first request from many respondents was to improve the reliability of public transport. Charly (O) explained that the whole multimodal system could be functional, but that if you miss a train because your tram was 1 minute late and you have to wait for 1 hour, it's not feasible. Perrine (N) also asked for trams to be on time more often and for connections to be better organised. Ana (N) also talked about expanding the train network, saying that "*some places in Belgium are like deserts*" and that it should be easier to travel around Belgium.

Another important point raised by many people, including Anne (N), is the lack of transport at late hours. The early stopping of trains, buses and trams do not encourage interviewees to use public transport. Perrine (N) thinks it would be nice to be able to leave when she feels like it without always having to take the last tram at midnight.

As far as cycling is concerned, the few people who spoke about it are now satisfied with the changes that are taking place in terms of roads, but they still expect more to be fully safe, as

Alice (N), Anne (N) and Victor (N) indicate. Similarly, there should be many more bicycle parking facilities (Muriel (O), Anne (N)).

In general, the respondents would like to see a unification of the means of transport, be it in terms of fares, timetables or feasibility. Muriel (O) explained that having to take a lot of different passes, one for the train, one for the STIB, one for the TEC and one for Delijn is firstly not practical and secondly very expensive. Aurélie (O) explained that when she travels, the timetables of the SNCB and the TEC are not coordinated and that efforts should be made in this area. Aurélie (O) also explained that it is difficult to take her bike on public transport, which is a shame because being able to combine public transport and the bike could be a big advantage.

In general, Muriel (O) and Victor (O) feel that prices should be lowered and that annual subscriptions are too expensive for the services offered.

And finally, Aurélie (O) also believes that carpooling could also be a possibility in the city, being very underdeveloped and having real potential according to her, explaining that the number of people travelling alone in their car in Brussels is alarming.

Car-sharing

Motivations

Several practical aspects are mentioned as motivations for car-sharing.

First of all, **comfort** is an element that is perceived either as a motivation or as a barrier to car-sharing depending on the individual. The perception of comfort seems to be relative to the situation considered as usual by the individual. For owners, the shared car is seen as an uncomfortable and impractical mean of travel (Olivier (O), Paul (O), Victor (O)). On the other hand, for those who frequently use public transport or soft mobility, the shared car represents comfort (Charly (O), Alice (N), Magali (N)). Charly (O) reminds us very well that a shared car *“is comfort because you still have a car. You're not in the rain on foot or by bike.”*

As mentioned earlier, **parking** is a daily problem for the inhabitants of Brussels. Several consumers (Laurent (N), Vincent (N), Muriel (O), Anne (N), Ana (N)) find car-sharing offers advantageous compared to individual cars on this point. People appreciate, for example with Cambio, the privatised car parks which guarantee a parking space at any time. In addition, the fact that they can park for free anywhere in Brussels is also a plus.

Moreover, perhaps a little more surprisingly, several participants (Charly (O), Ana (N), Perrine (N), Vincent (N), Laurent (N), Magali (N), Philippe (N)) cite **flexibility** as one of the advantages of car-sharing. Indeed, users seem to appreciate in certain situations (e.g., going out) being able to use the car and not needing to come back for it afterwards. Moreover, non-car owners tend to compare this solution with the other solutions they use in their daily lives, such as public transport. For them, using a car-sharing offer gives them more flexibility; being able to take the car when they want and go where they want (Ana (N), Magali (N), Charly (O)). Sylvain (N) even talks about a feeling of freedom linked to the fact of not owning an object but rather renting it. For Magali (N) it is: *“not owning a car but still being able to access this freedom that the car offers in certain circumstances.”*

It has already been mentioned several times because indeed, the **price** seems to remain one of the main criteria when deciding on the means of transport. Many participants point out that taking into account all the costs of a car, car-sharing is much more interesting than a private car. (Anne (N), Ana (N), Paul (O), Muriel (O), Philippe (N), Sylvain (N), Magali (N)) Paul (O), a car owner and non-user of car-sharing, said: *“I imagine that a private car costs more with all the costs of insurance, taxes, purchase, petrol and maintenance.”* Alice (N) sums up this idea: *“It's clear that when we travel and go to dinner with friends in Walloon Brabant, it can cost us 70€, it's expensive at the time but in the long term it's less expensive than owning your own car. At least for the use we make.”* However, it's only financially interesting if the car is used occasionally (Charly (O), Sylvain (N), Laurent (N), Magali (N)) For, Magali (N) and Aurélie (O), avoiding the responsibility of looking after a car is something they are ready to spend a little more of money for.

As we discussed in the motivations of public transport and soft mobility, **sustainability** can be an additional motivation for several interviewees. For many of the interviewees, car-sharing was indeed seen as an alternative means of mobility that leads to more sustainability. It is not so much seen as more sustainable as such, it remains the use of a car, but as a means that could push towards other more sustainable means of mobility. The use of the car was reduced to the only journey where it is perceived as indispensable. (Alice (N), Magali (N), Aurélie (O), Juliette (O), Anne (N), Philippe (N), Vincent (N), Muriel (O))

Although this is far from being a sufficient motivation to replace the private car with car-sharing, Charly (O), Laurent (N) and Aurélie (O) still appreciate the fact that they can drive

and **try different vehicles**. For other users, it might rather be seen as a disadvantage to have to learn how each car works.

Barriers

Philippe (N), Anne (N), Ana (N), Alice (N) and Sylvain (N), all car-sharing users, acknowledge that replacing their personal car with a shared car requires **more organisation and planning**. Magali (N) points out that they always have to anticipate a little, especially at weekends.

For Victor (O), this **lack of freedom** is a real brake. For Paul (O) and Muriel (O), the fact that they have to bring the car back to the same place is a constraint that they do not appreciate. Perrine (N) says: *“you have less freedom, less flexibility and you really have to know in advance when you need a car.”*

Moreover, the **uncertainty about the availability and proximity** of the vehicle seems to be a concern for non-users (Aurélie (O), Charly (O), Muriel (O), Vincent (N), Victor (O), Juliette (O), Olivier (O)). They doubt that the vehicles will be available when they need them (e.g., at peak times, in the evening and at weekends). They also do not want to have to go far from home to get the car, to have to walk a long way or to take another means of transport to get to the car. Charly (O), who is a former user, also says that for him the biggest barrier is availability. Aurélie (O) said: *“When you need a car at a specific time, it brings additional stress; will it be available? will it start? will I be able to contact someone who will come and help me in time if I have a problem? It's the uncertainty of not owning the car that is the biggest barrier.”*

Alice (N), Magali (N), Ana (N) and Charly (O) also mention the fact that they have to use a phone, install **the app**, pay by credit card, etc. Ana (N) talks about the situation when her phone ran out of battery, and Charly (O) talks about when there is no internet connection in the car parks. Alice (N) highlights another problem, that of older people who do not own or master smartphones, etc.

Car-sharing is also sometimes **perceived as expensive**, especially when considered on a per-use basis. (Aurélie (O), Perrine (N), Charly (O), Vincent (N), Sylvain (N), Ana (N), Anne (N), Juliette (O)) According to Charly (O), car-sharing is much too expensive for a private person. He compares it with a company car, which is "free" in people's minds and is always available, and with a leased car: *“Let's take a normal car lease, we have 500€ per month. If I only use*

car-sharing 4-5 times a month, we reach this amount very quickly.” For Juliette (O), a student, price is an important factor, and she does not see how car-sharing could become more financially interesting than her €12 STIB pass for internal trips in Brussels. Perrine (N) and Laurent (N) do not like the fact that they have to pay the subscription every month if they do not use it regularly. Since there are activation and start-up costs, it discourages them from trying the offer in the first place. Sylvain (N) agrees that this is a disincentive to change his habits. For Aurélie (O) it's the combination of subscription and cost per use that seems high. Aurélie (O) also think that Cambio's pricing system seems complex. *“Cambio's tariffs make me laugh, it's always extremely complicated: there's a subscription, then a daily tariff, then another one. You're supposed to have a degree to understand it.”* For Vincent (N) it is the differences and subtleties between the offers that are complicated to understand. For Perrine (N), Juliette (O) and Vincent (N), imagining the budget that this represents is not intuitive; for example, converting and estimating the per-minute rate into a monthly budget. Paying by minutes also seems to be a source of stress; paying to be stopped in traffic jams, feeling obliged to drive fast, setting up and starting quickly, etc. (Victor (O), Aurélie (O), Perrine (N), Charly (O))

Some people also perceive car-sharing as **unsustainable**, which may discourage adoption. Charly (O) has doubts about the sustainability of car-sharing. *“They have a model where cars last 2 years. Then, they replace it with a new car. So, these are quantities of cars that are produced.”* Perrine (N) or Sylvain (N), for example, believe that car-sharing remains a use of the car and is therefore not extremely sustainable. Which is why ecological reasoning would push them more towards public transport or soft mobility means than towards car-sharing.

Until now, the barriers mentioned were rather rational, and linked to the practical use of car-sharing. Another form of barrier can be identified in the testimonials, one that is rather emotional.

Ownership is valued by the participants for 2 different main reasons. (For non-car owners, the question of ownership was asked in relation to other vehicles: bikes, scooters, etc.)

First, practicality. Several people tell us that this is not really linked to the fact of owning but to the resulting advantages of owning (these are more developed in motivations for private cars):

- Comfort: mixing comfort of vehicle, such as good condition or high quality, and quality of life with the ease of use or the low exposure to weather. (Aurélie (O), Anne (N), Paul (O), Vincent (N), Laurent (N), Magali (N), Sylvain (N))
- Availability and proximity: being sure that at any time, you can have what you want to travel and not too far. Being able to face whatever happens at any time (Paul (O), Vincent (N), Victor (O), Muriel (O))
- Investment: having the possibility to sell what you owe, preferably at a higher price, but to be sure you can have a return on what you paid for (Charly (O), Victor (O))
- Security and certainty that the object works (Muriel (O), Perrine (N), Magali (N))

Secondly, there is also an emotional attachment to ownership:

- Status and image: Ana (N) tells us that the day she can afford her own car she will be proud of it. Victor (O) also talks about this feeling of pride. Paul (O) feels he has earned the luxury he can afford today. For Charly (O), the appearance of his car is also important when he goes to see customers.
- Freedom: being able to do what you want when you want, the feeling of complete independence, not owing anything to anyone (Paul (O), Muriel (O), Victor (O), Vincent (N), Magali (N), Ana (N))
- Pleasure and passion: pleasure at the time of purchase, the feeling of well-being (Charly (O)). Paul (O) likes the fact of owning beautiful things, a beautiful car. Charly (O), a sports car enthusiast, bought a car for this reason, he drives it very little. Perrine (N) said, *“I think it's something you can relate to, it's a bit like my jewellery again, it's part of me, it represents a history, it's something that has sentimental value and with the things you rent, well, you can't really have a sentimental attachment because afterwards, it's not yours anymore.”*
- Private place: feeling at home, being able to leave one's things there, an extension of the home and office (Perrine (N), Paul (O))

Another concern of the participants seems to be the **uncertainty surrounding sharing** and the **lack of trust** they have in other users. Many individuals do not trust other users to take care of the vehicle, especially with strangers. (e.g., believing that they would put dogs in the car or smoke, that they would break something and try to hide it, they would leave the car dirty, etc.) (Charly (O), Aurélie (O), Olivier (O), Muriel (O), Ana (N), Magali (N), Victor (O)). It first shows that sharing is difficult, but that sharing-out is even more. Indeed, with the respondents

having trust problems, the problems were lower when speaking about close people, like family or close friends. It shows that sharing-in is more comfortable for them than sharing-out.

That's why they think that the role of the company is important to manage quickly the worries due to sharing (Ana (N), Magali (N), Muriel (O), Aurélie (O), Vincent (N), Olivier (O)) They need to be able to trust the company, to feel assisted in case of a problem. Magali (N) and Alice (N), for example, feel more confident thanks to Cambio's control and legislative framework service.

Sharing ownership of a vehicle with other individuals also raises some concerns. Magali (N) thinks that she would be disturbed by the common management and all the difficulties which result from it. Sylvain (N) finds it difficult to see how there is no conflict in a community. Laurent (N) also expresses his doubts about finding a compromise that suits everyone. Muriel (O) thinks that between individuals, there is no guarantee that things will be done properly. Some also worry more about damaging another person's car than a B2C car (Alice (N), Vincent (N), Magali (N)).

When the vehicle belongs to them, it is all the more of a hindrance for fear that it will not be taken care of (Juliette (O), Olivier (O), Magali (N), Aurélie (O), Paul (O), Muriel (O), Perrine (N)). In any case, they do not consider lending their car to strangers. Juliette (O) says: *“I would prefer not to own myself but to own together, all of us, and that we all have the responsibility to make sure it is in good condition. That we all feel concerned and that we are all equally careful.”*

Paul (O) clearly shows the attachment that certain profiles can have to their habits: *“I would rather go in a car that I know than complicate my life by changing my habits that have worked for 40 years.”* **Changing one's habits** may be perceived as an additional effort. It is perceived as not worth it if the innovation does not bring more positive results than the one before. (Vincent (N), Paul (O), Victor (O), Magali (N), Perrine (N), Anne (N)) Ana (N) mentions that having to learn about innovations and having to look for information can already stop her. The participants mentioned that if the learning phase is too long and complicated it acts as a big barrier. Muriel (O) says: *“I am totally for innovation, but I have to be taught or given the means to learn in some way and preferably in a simple way.”* For Olivier (O), when adopting an innovation there is also a feeling of insecurity, about taking risks. There is a fear that it would be non-reversible, a fear of the unknown, a fear of change. For some others, changing their

habits is perceived as fun and exciting. However, they generally expect change to be easy and intuitive (Juliette (O), Philippe (N), Charly (O), Sylvain (N))

Consumers' perceptions summary table

As explained at the beginning of the results, we decided to mention only the attribute of car ownership as an acronym in the text for reasons of clarity but also because it was the one emerging the most from the interview, which is quite logical since the aim of this thesis would be to replace the private car by a model of functional economy where the ownership is not the main model anymore. It doesn't mean that the other attributes have been neglected, as you have been able to see in the text where every aspects and attributes are mentioned, but that it is less impacting.

With this summary table (Table 4) the goal is here to make a comparison between owners of individual car and non-owners about the decision factors that have been mentioned to see properly the difference between these two profiles. It is important to point out that only the majority tendencies of these two groups will be mentioned and that not all people belonging to the designated segment always agree with what is written.

| Decision-making factors | Profile segmentation based on car ownership | |
|---|---|---|
| | Have individual car, "O" | Don't have individual car, "N" |
| Control & freedom Being free, not depending on anything, having access to any destination | The individual car is a symbol of freedom that allows them to go anywhere, anytime. They are afraid of losing this autonomy if they get rid of the car. | The car allows freedom, but the individual car is sometimes seen as a constraint whereas the shared car allows them not to own a car but to enjoy the freedom of the car when necessary. |
| Efficient & productive Time savings on travel and parking, use of transport time for other purposes | In the city, the car is sometimes a waste of time. Outside it's usually much faster. Other means are perceived to be much slower than the car. The time lost to park is a barrier | In the city, the car is a waste of time. Outside it's often a time saver, but other transports allow you to make this time profitable by doing something else. The time lost to park is a big barrier. |
| Comfort Vehicle comfort, life comfort, proximity, exposure to weather, low stress, ease of use, autonomy... | Attaches great importance to comfort, not only vehicle comfort but also a general comfort of life. Comfort relative to the situation. To separate from their own car would be experienced as a loss of comfort. | For those who frequently use public transport or soft mobility, the shared car represents comfort The stress of driving in Brussels motivates them to use other means of transport in the city. |
| Cost & responsibilities Overall costs, responsibility of ownership | Tendency to use the car frequently and therefore perceive it cheaper to have your own car. Ready to pay more to keep the comfort of life. | Perceive individual cars as extremely expensive. Tend to use the car occasionally so find it more attractive to pay per use. Sometimes even prefer to pay more to avoid the stress of responsibilities. |
| Flexibility Being able to adapt to any eventuality, low organisation, alternatives | Public transports don't allow flexibility Uncertainty about availability, feeling that shared cars will not be there when they need it. Do not like the increase of organisation needed. | No need to return your car to the same place, one-way travel is possible. Car-sharing is more flexible than public transport. Acknowledge that more organisation is needed when you don't own a car. |
| Ownership Rational (e.g., availability), emotional (status...) | Having to let go of possession is very difficult because of the perceived benefits, whether rational or emotional. | Say they are detached from possession per se (possible attitude-behaviour gap). but recognise the practicality of possession. |
| Sustainability Favouring less environmentally damaging mobility | Tend to see sustainability as secondary, as a plus and not as a decision factor on its own. Raise doubts about the sustainability of car-sharing. | Tend to see sustainability as a more or less important decision factor. Favour public transport and soft mobility in terms of sustainability. Perceive car-sharing as sustainable in terms of car use reduction and grey energy but it's still a car. |
| Lack of trust Sharing-in, sharing-out | More likely to have lack of trust, especially with the sharing-out concept. Are more inclined to make sharing-in. | Have less challenge with sharing-in or sharing-out. Platforms that provide a clear framework increase their "trust". |
| Changing habits Have to radically change their habits, easy to use | Challenges to change their habits. Real need to have big benefits or to be forced to make changes. Need for ease of use and testing. | Some of them have never had a car so have not experienced a big change. Others were ready to change if the learning process was easy enough. |

Table 4: Perception comparison of the several decision making factors between car owners and non-owners

CHAPTER 4: DISCUSSION

The objective of this section is to discuss the role that car-sharing can play in the transition to more sustainable mobility and its potential for consumer adoption. The discussion will first focus on how can car-sharing lead to more functional mobility, understanding its impact on the adoption of more functional mobility, discussing whether car-sharing can favour the transition to ownerless mobility and trying to understand why car-sharing is necessary to the creation of a functional ecosystem that could replace the private car-based model. After that, the discussion will focus more on the potential of car sharing adoption. The aim will be to dig into the barriers and motivations of this means of transport, allowing to understand what are the main issues and what recommendations can be given to improve adoption.

How can car-sharing lead to more functional mobility?

Functional mobility

As a reminder, functional mobility, based on U-PSS business models and collaborative consumption models, provides mobility as a service. Functional mobility is separated from the ownership of a vehicle and focuses rather on the use. It is the access and use of a good or service that is provided to customers, rather than ownership of the product itself.

U-PSS and collaborative models are increasingly common in the mobility sector. Companies and authorities are seeking to both, promote more sustainable transport solutions and meet the changing needs of consumers. A recurrent example of U-PSS in mobility is public transport. Public transport provides access to a transport service. Users pay for the use of the service, they do not at any time obtain ownership of the vehicle. Other forms of transport that may belong to functional mobility are shared cars, shared bikes, shared scooters, etc. but also, taxis and Uber or carpooling and renting.

However, it should be noted that the economy of functionality is not just a business model. According to the IEEFC: “*The economy of functionality consists in providing companies, individuals or territories with integrated solutions of services and goods based on the sale of a performance of use or a use, and not on the simple sale of goods*”. We are therefore moving towards the functional economy when we offer customers an integrated set of products and services, rather than goods and services that are dissociated from one another. It is then

necessary to develop an ecosystem by broadening the scope of activities and actors (IEEFC, 2022)

To develop these integrated solutions and this ecosystem, cooperation between the various players (companies, local authorities, users, etc.) is essential. This ecosystem is developing on a territorial scale.

When we ask ourselves how car-sharing can become a driver for the adoption of the economy of functionality in mobility, we must therefore ask ourselves

- What type of consumer need and use does car-sharing meet? Does it fill a gap in other functional mobility alternatives?
- How does it contribute to the creation of this ecosystem? What role does it play in the ecosystem?
- How does it address one of the biggest barriers to functionality: ownership?

Foster car substitution

Attachment to ownership:

According to the theory, Belgian consumers still have strong cultural preferences for ownership. In the field study, a majority of the participants did not say they were interested in ownership. They did, however, recognise the practicalities of ownership. It is probable that we are in an attitude-behaviour gap situation. Some but few participants admit wanting to own, and feeling the need to own, to gain a sense of pride, freedom, and control,... In order to analyse the irrational attachment of the consumer to possession, a more detailed field study focusing on consumer behaviour would be necessary. Anyway, in order to motivate consumers to detach themselves from the need to possess, it is necessary to create a sufficient competitive advantage.

Car perceived as essential

Beyond the attachment to car ownership, there is also the perception that the car is essential. Indeed, the participants mentioned many times that the car allows them to meet needs for which there is no other answer. In terms of current consumer needs and expectations, the car could not be dispensed with 100%. Several examples cited were: transporting bulky objects, going to poorly served destinations, timetables, travel time, going on holiday, driving children, etc. For

some, the feeling of freedom and independence was also one of the elements they could not do without.

Shared cars can meet a large part of these consumer expectations, better than other solutions of the economy of functionality. When thinking about mobility, consumers seem to think about their limit use i.e., they need to find an existing solution for each of their travel needs, even in exceptional situations. However, public transport does not always seem to meet the needs and preferences of all individuals. This is where carsharing offers greater flexibility than other services in meeting these needs conveniently and cost-effectively for the consumer. Where other offers only allow the addition of the functionality economy to vehicle ownership, carsharing to some extent promotes the complete substitution of the individual car.

Impact on household vehicles

Achieving 100% functional mobility is still far from being the norm for the inhabitants of Brussels, but among carsharing users, we can observe a reduction in the number of vehicles owned by households and a reduction in the size of these. Replacing a car with a bicycle or scooter or a smaller car, having only one vehicle for the household etc. Since there are car-sharing solutions for exceptional needs, it allows consumers to move away from the notion of limit use. Consumers are satisfied with a vehicle that meets the majority of their needs.

Reduce car usage

As seen in the theory and confirmed in the interviews, pay-per-use emphasises the cost of each use. In contrast, the use of a vehicle owned by the consumer seems almost free, except the cost of fuel. From a financial point of view, pay-per-use, therefore, discourages consumption. Moreover, access is made more complicated, the consumer has to make more effort to access goods and services. Consumers, therefore, say that they are more likely to think before using the car and will only use it in situations where it is perceived as really useful. Each trip is made more consciously and thoughtfully. Soft mobility and public transport thus become the first options considered by consumers and the car would become the backup when other alternatives are not suitable. Car-sharing thus favours the transition to occasional and residual use of the car.

In concrete terms, car-sharing makes it possible to continue to guarantee access to a car when needed while encouraging the search for other functional alternatives such as public transport.

"Car-sharing is the future of the car in the city. On the one hand, it allows families to have access to a car without having to bear the costs alone. On the other hand, it encourages a residual use of the car, used only when there are no efficient alternatives (walking, cycling, public transport). For example, to go shopping for furniture or to accompany a relative to a medical appointment. The other huge advantage of car sharing is the parking space it frees up in the city for the people of Brussels. These freed-up spaces can be used to develop a quality public space: terraces, trees, parks, children's playgrounds, larger pavements, and thus build a more fluid, greener and more user-friendly city." Said Elke Van den Brandt, Minister for Mobility (Getaround blog, 2021)

Develop an ecosystem

As mentioned in the previous section, the consumer needs to have access to an appropriate mobility solution for each trip. The objective is not to replace a private car with the constant use of a shared car. To move towards functional mobility, consumers need to be convinced to use a range of solutions on a daily basis. It is therefore essential to promote the adoption of the functional economy to develop a complete and diversified ecosystem that can alone meet all mobility needs.

As mentioned earlier, carsharing offers a travel alternative when there is no other one or when the others are perceived as unsatisfactory by consumers. It is therefore an essential link in the creation of this ecosystem.

Daily mobility

In order to increase the uptake of the functionality economy in mobility, consumers need to have at least one mobility alternative for each need. It is essential to simultaneously offer solutions that meet both the regular and irregular trips of the potential user. Carsharing users do seem to use public transport or soft mobility on a daily basis. The journey to and from work should preferably be made by alternative modes to the car.

Wide range of offers

The ecosystem must be composed of as many modes of transport as the needs felt by consumers. It must therefore be made up of a set of diverse and varied solutions (bus, tram,

taxi, etc.). Like the other alternatives, carsharing is therefore an essential element that, by its presence in the ecosystem, encourages the adoption of a set of mobility means.

Within carsharing itself, it is useful to propose different types of offers (B2C, P2P,...), with different types of rentals (free-floating, per minute,...) and different types of vehicles (7 seats, van,...). By offering a wide range of services, we provide consumers with more flexible and convenient options, allowing them to find the most suitable alternative for each need.

Networks and combinations

The creation of this ecosystem is therefore a key factor in encouraging the adoption of the functional economy. Participants felt that the network currently does not sufficiently encourage intermodality. In addition to having expectations of improving the offers independently of each other, they also mention expectations of integrated solutions. Developing partnerships between car-sharing providers and other transportation providers could allow a more comprehensive and integrated mobility solutions for consumers. The establishment of car-sharing stations near railway stations, for example, could increase the potential for intermodality. Fare integration is another example. To go further, we can think of mobility as a service, combining networks and modes of travel to present an integrated service rather than a set of products and services.

What is the potential for consumer adoption of car-sharing?

Discussing car-sharing consumers' barriers

During the interviews, two types of barriers were put forward, practical barriers and emotional barriers.

As far as the practical barriers are concerned, the information from the theory seems to be confirmed by the different interviews conducted, showing that the barriers are indeed attributable to car-sharing and that they must be taken into account in the analysis and in the search for potential solutions.

What can be concluded from the interviews is that respondents with a private car agree that car-sharing would require additional efforts that not all of them are willing to make, be it in terms of proximity, planning and all the other factors already mentioned above. This is seen as a loss of flexibility and autonomy that most consumers do not like. As far as availability is concerned, it seems that this barrier is closely linked to proximity. Indeed, when respondents

spoke of availability, they often spoke of "cars available near their homes". They are therefore aware that a car would in most cases always be available in one way or another, but that cars that are too far from home would be equivalent to an unavailable car. It is important here to distinguish between the real risk of stockout and the perceived risk. For the former what is needed is better logistics, for the latter better communication. Given the number of shared cars in Brussels for the number of users, most of them are available frequently, but the individual fears that it will not be available when he or she wants to use. And it is perceived as a sacrifice to have to change his or her schedule according to the availability of the cars.

In addition to all these extra efforts, some also have the impression that the conditions of use would not be optimal, joining the theory of poor expectations, with cars in average condition, with odours or safety problems.

The reluctance to commit is also to be taken into consideration. Some car-sharing offers demand commitment, with payment of subscription or deposit which doesn't help people to adopt car-sharing.

What can be concluded from all these interviews is that people who own a private car have difficulties with non-ownership for the practicalities that are linked to it. Consumers have a much higher level of comfort with the private car, or at least they perceive it that way.

For people who do not have their own car, car-sharing is an additional offer that allows them to meet certain needs that cannot be met without a car, which is quite enjoyable for them. The barriers are also present but have less impact. Firstly, because the perception is relative to what people usually experience so non-owners tend to face smaller barriers. Secondly, because these barriers are counterbalanced by the motivations mentioned above. However, this does not prevent some of the interviewees, like Ana, from thinking about buying a car of their own one day, which also proves that non-ownership and the resulting barriers are still important to take into account for these people.

But, as mentioned in the literature review, ownership is not only about fulfilling a need but has also big importance to create a status, an image and a sense of control in the society, which is, therefore, more linked to psychological, and emotional barriers.

Even if it is not the majority, some people did not hesitate to talk about social status, the fact of owning your own car and the way others look at it, while others also explained that they have this somewhat individualistic side, not needing anyone to get around and being able to

rely only on themselves or having joy and pride in having a nice car. Others also expressed the emotional attachment they have for objects and the importance they can have on the person, while finally, some also like to feel at home in their car and have this need to have places that are private.

In addition to all these factors, there was also the factor of trust in others that was mentioned a lot. A factor that is also ultimately related to not owning the car. The interviews show that, in one way or another, there is still a lack of trust in others in society and that this lack of trust leads to people not using this kind of offer. The analysis can go further, explaining that some of these people would have more difficulties sharing with unknown people than with people close to them. It is clear that sharing-in is easier to adopt for these people than sharing out, even more with valuable goods.

A last psychological problem, that is not related to do with property as such, but which is also quite present in the heads of the respondents, is the difficulty of changing habits. This shows that changes in habits are often difficult to make in general and that they are even more difficult when people do not feel the benefits. What can be concluded from this observation is that, given all the barriers mentioned by the interviewees, these people will have great difficulty in adopting this kind of innovation because they will not want to change their habits and risk losing comfort.

Another analysis that can be done out of all this is also that the barriers differ according to your profile, whether you have a car or not, but also according to where you live or your social class.

Some barriers to adoption are also more or less important depending on where you live. Respondents around Boitsfort did not express problems with parking or advantages of having a private parking space with services like Cambio, even explaining that the private car was much more attractive being right in front of their house, while people living in Schaerbeek directly explained that parking spaces were a big barrier to the private car and that car-sharing was a big advantage in that respect. These examples can be transferred to other issues, such as the lack of public transport in some places more than in others etc.

For people who own a car, the fear of ownerless consumption and the need to radically change habits are very strong. Taking the risk of getting rid of their car is a step that most people do not seem ready to take because they perceive mobility without ownership as a loss of quality of life. Indeed, for the time being, the shift to the functional economy seems to be perceived as

a sacrifice. Motivations do not overcome the obstacles. The financial aspect and the ecological perception, which are developed in the next parts, can still act as motivations but are rarely sufficient.

For people without a car, the problem is somewhat different. The barriers to ownerless consumption will have less impact. This does, however, not mean that they will not exist, as they are always on people's minds when they make their decision. For example, some of the young people interviewed could not yet afford to own a car but were considering it for the future. Besides this, car-sharing is often perceived as rather attractive by non-owners as it is seen as an increase in quality of life compared to a situation without a car. The pay-per-use and the non-ecological perception remain nevertheless obstacles for them.

It is therefore important to realise now that car-sharing is an attractive model for non-owners who regularly use public transport or soft mobility, but an unattractive model for owners. The objective here is to understand how to substitute the use of the private car by functional mobility means including car-sharing and not to substitute public transport or soft mobility by car-sharing. For this purpose, car-sharing must remain less advantageous than other means and it should also be a simple complementary solution to meet specific and occasional needs. However, the entire ecosystem must become more attractive than the private car. Ownerless consumption must be given a competitive advantage over the private car. This is developed in the section “recommendations”.

In conclusion, an important fact first is that the barriers can differ depending on the different profiles and that it has to be taken into consideration when thinking about solutions, in order not to miss some barriers that the consumers can face. Another conclusion is also that the barriers are strongly linked to property, a principle that is very present in Western culture, and it is clear that the change in mentality is not yet fully present. However, the shift is slowly taking place, as we can see from the interviewees. As mentioned in the methodology, it is however important to take into account that our study is biased and that the interviewees who have already changed their mentality do not represent the majority of the inhabitants of Brussels, but we can say that the shift is taking place little by little and that it will undoubtedly continue to do so given the current trends.

Price as a decision criterion

It is also important to talk about the price as a factor about whether or not consumers adopt car-sharing. Indeed, all interviewees discussed the price at some point during the interview, usually even without being asked.

Price seems to play an important role for the majority of the interviewees, even if it is not the only decision criterion taken into account. Indeed, all of them bring cost into the equation. Price, therefore, plays a motivating role in some cases while acting as a barrier in others. However, they all still want to meet their travel needs. The price criterion can therefore be overtaken by others such as comfort or even the lack of alternatives. For example, Anne generally prefers to take the train rather than the car to go to Louvain-la-Neuve because it is cheaper, but she does not know how to get home late in the evening, so her need is not met. She therefore decides to use car-sharing because it meets her needs at the lowest cost.

In the case of car-sharing, it is easily distinguishable that the price of car-sharing is a form of barrier for non-users who do not have a car. They feel that their means of transport, i.e. public transport, cycling, walking or any other means of multimodality are cheaper than car-sharing which can be very expensive, mainly referring to B2C car-sharing models. The idea of the real cost of the other two car-sharing models would then seem to be more in line with lower costs to meet certain needs like the one expressed by Anne earlier.

For non-users who have a car, the cost factor usually ranks behind other factors. The literature review, dealing with the fact that most people do not realise the total life cycle cost of the car and are therefore not always objective about the perceived price of a car, seems not to be confirmed by the field. Indeed, all interviewees unhesitatingly expressed the fact that a personal car was extremely expensive, given all the costs to be taken into account. What can be analysed, however, is that people with a car are willing to pay more to keep their life's comfort, as long as they can afford it, given all the barriers mentioned in the corresponding chapter. However, the trend that tends to emerge is that of a decrease in the number of cars for the household. Indeed, the private car still seems essential in the eyes of some people, but the idea of reducing the number of private cars for a whole household seems to be a feasible option, allowing to reduce expenses while keeping the advantages of private cars.

Finally, as far as users are concerned, price also plays an important role, even if it is difficult to identify a trend. Price remains important because, even though they are users, respondents still tend to prefer public transport or bike, which are cheaper than car-sharing, when they have

the possibility to do so. Secondly, they will also express the fact that they choose the cheapest car-sharing model according to their use. However, very few of them talked about collectivities or P2P, being based on the real price and therefore probably cheaper than B2C services. Two analyses can be drawn from this. Firstly, some car-sharing consumers prefer to use means offered by companies, finding them more secure and offering more guarantees, and secondly, there is also a lack of awareness of other car-sharing systems. Price is therefore not the only factor influencing consumers' decision-making power.

In conclusion, the price seems to be of paramount importance, and has a very important role to play in the adoption of any mobility solution, both for those without a car and for those with one. It seems obvious that the less the individual can afford, the more important the cost factor is. But what emerges from our interviews is that price is rarely a sufficient factor on its own to motivate people to give up the private car.

Sustainability as a decision criterion

Although car-sharing tends to have a role in the adoption of more sustainable mobility, the sustainability factor does not seem to have the biggest impact on the adoption of car-sharing. Considering the sustainable consumption trend, the impact is surprisingly low.

Indeed, a large majority spoke of sustainability as a motivation in their means of travel, whether it was a primary factor, really paying attention to your modes of transport, or a secondary factor, being seen as a plus without weighing in the choice made. Several candidates think about their daily mobility for environmental reasons (taking public transport, reducing their use of the car, etc.) but for very few it is number one criterion. Most mentioned it as a secondary factor. They are happy that their behaviour has a low ecological impact, but they recognise that this will not be a sufficient factor to motivate them to more sustainable consumption, they need other additional reasons.

Furthermore, they do not consider car-sharing to be the most sustainable means of transport, and rightly so, as it is still a polluting car. The advantage they get from it is that they could avoid buying, which consumes grey energy, and that they use the car less than they would probably do with a private car. So, they feel that the contribution is not negligible, but that this is not the reason why they do car-sharing. The reason is to be able to make journeys that they cannot make without a car. The impact of sustainability on the adoption of car-sharing does

play a role for those who have a private car or are about to buy one. Indeed, the ecological side of car-sharing may motivate people to part with their private car.

Another problem lies in the extra effort involved in switching to car-sharing, which again brings up all the barriers mentioned earlier. It seems that the barriers would continue to have more weight than the motivation on the ecological side.

Diffusion of car-sharing

A general problem for all and that clearly has a huge impact is the lack of awareness of car-sharing. Some interviewees did not even know that car-sharing existed, while others did not know about all the different forms. The reality is that people are not at all encouraged and informed enough about this kind of practice, and without this, it is impossible for them to think about it.

Once the individual is aware of car-sharing offers, another hindrance to adoption that occurs is that he might develop an unfavourable attitude towards car-sharing. Most non-users interviewees had poor expectations of the quality of the service they would get and were not satisfied with the offers.

The implementation step also seemed to be a problem. Testing car-sharing services without commitment seemed to be something that could interest interviewees. At present, individuals who are not convinced by the innovation never go to the point of trying it because testing is made difficult and engaging.

When looking at the state of the functionality economy in Belgium, we realise that we are leaving the innovation phase and that we will now have to convince the "early adopters". Nearly 200,000 people using car-sharing were registered at the end of 2021. This means that 2.5% of all licensed drivers have already used carsharing. (autodelen.net, 2022) If we take Rogers' figures into account, this means that we are leaving the innovator phase. This might allow strong growth with a large increase in the market share. However, in order to continue to increase consumer adoption, it is necessary to convince the next category, the early adopters, which can be a challenge. Although early adopters generally have a high acceptance to change and the ability to change their behaviour, the barriers to change are higher than those of the previous category. In order to achieve a larger market share, it is therefore increasingly necessary to identify consumer barriers and find ways to overcome or bypass them.

Company car

An important point to raise in this work is the direct and huge consequences of the company car in Brussels. The company car is still too much of an advantage in the perception of people, they perceive the car almost as something free, as well as the consumption with the petrol card. In addition to this fiscal advantage, company cars mix the advantage of private and shared cars, providing an always available car with the liability barriers being extremely low compared to classic private cars. In short, these company cars have absolutely no competition in terms of transport and represent a large proportion of the vehicles in Brussels.

The current model favouring the company car is one of the big barriers to the adoption of a mobility not centred around the individual car. This, therefore, has to be fought as much as possible to enhance the adoption of functional mobility. Not to mention the negative effect of the company car on the environment. The trend with company cars is always pushing consumers towards the upgrades and the next versions, ending up in vehicles being larger than what is really needed by the employee and more polluting than smaller city cars.

Recommendations – How to motivate car-sharing adoption?

In light of this report, we understand that in order to encourage the transition to a more sustainable and functional mobility, it is essential to simultaneously encourage and facilitate the adoption of a range of means of transport (car-sharing, public transport, taxis, car-pooling, etc.). The city of Brussels is acting in this direction with the “good move” plan and its desire to design mobility as a service.

Following on from this thesis, here are a few concrete recommendations on what could/should be put in place to promote and encourage the adoption of car-sharing by consumers beyond early adopters.

From our paper it is clear that the environmental factor is not a sufficient motivation for a large majority of consumers. The consumer must be able to perceive a competitive advantage to this new option before changing his habits. To motivate a shift in consumer behaviour, the individual must find a personal interest. Then, how can car-sharing offer a competitive advantage over private car?

Let's be honest, car-sharing will probably never be able to compete with the availability, freedom and comfort of a private car. So, the need is to focus on other attributes. First of all,

the perception of ownership. Currently, people still tend to favour ownership, finding it more convenient, giving you more control and more freedom. It is this perception that we need to work on. The aim is to show consumers that ownership has a lot of disadvantages and that it can even mean a loss of freedom. Whether it's the insurance to manage, the maintenance, the fear of theft or damage, or the management of car parks, all these things have become normal in the minds of consumers, and we must succeed in making them perceive that these are factors that they could get rid of and that they are not really free at the moment

Secondly, to offer a parking advantage to car-sharing users. Belgian cities such as Ghent, Brussels and Antwerp have understood this. The difficulty of parking in an urban environment is one of the big disadvantages of the private car that needs to be addressed. By offering reserved spaces to car-sharing users, we give them a competitive advantage over the private car.

Moreover, improving infrastructure, making the use of U-PSS as convenient as possible for users; increasing the size of transport networks and making it easier to switch from one network to another or even considering all services as part of one big network. Partnerships between car-sharing providers and other transportation providers can offer integrated mobility solutions and facilitate intermodality. Offering a wide variety of different services and vehicles also provides a competitive advantage. The user has the possibility to use the type of vehicle (electric, SUV, van, etc.) he prefers when he needs it.

Beyond the competitive advantage, non-car-sharing users seem to have poor expectations about the quality of service they will receive. Currently, elements such as the difficulty of access, fear of unavailability, the start-up costs or the long-term commitment do not motivate an individual, who is not or is little convinced, to try the service. It is therefore mostly only individuals that are convinced by the service who will make the effort to adopt it. To encourage all types of users to change their habits, it is, therefore, necessary to make the change as easy as possible: easy registration, intuitive app, simple and clear operation, etc. It is also necessary to make this change less engaging at first. Users are afraid to commit to a one-year subscription until they are convinced by the system. It is therefore essential to encourage users to try out the service first with little commitment and risk. Communication also needs to be improved to change consumers' poor expectations and apprehensions.

Platforms can, to some extent, play the role of facilitator, by enabling contact between individuals, an easier organisation and by increasing the level of trust, making the adoption of

car-sharing easier and more intuitive. Moreover, car-pooling could also be part of the ecosystem and platforms seem to be the best option for this type of offer, helping to find car drivers going to the same place as you and being able to pick you up in exchange for shared cost for example.

Another observation on car-sharing was the lack of awareness of the population towards this transport offer. The aim would be to increase communication about these offers, both from companies and various institutions such as Brussels Environment or Brussels Mobility. In addition to this, it is also essential that this communication comes from the users themselves. They said that they had already discussed car-sharing with certain people who were hesitant and who finally decided to adopt it. A recommendation could be to motivate users to communicate around them, and to promote this type of transport through sponsorship for example.

To conclude, a final way of changing consumer habits, these behaviours that have become automatic, is through changes in regulations; putting penalties on behaviours that we wish to avoid or incentives on those that we wish to encourage. In this case, it is a question of discouraging the use of the private car by making it more complicated: taxes, regulations, and bans. This is what Brussels is working on with the Good Move plan. Within Brussels, access by car is made more and more complicated (30 km/h zone, low emission zone, etc.) On the other hand, Brussels also offers incentives and encourages residents to give up their private cars thanks to the Bruxell'Air bonus. Regulations that need to be changed in Belgium are the ones concerning the company car. The company car is currently far too attractive for the consumer that no other means of transport can compete financially.

In summary, most car owners do not seem to be ready to part with their own car yet. It is still too much perceived as a sacrifice. There are therefore two main ways to motivate change: the carrot and the stick. Changing the perception of other means of mobility to make them more attractive than the car would be an incentive to motivate change. Change can also be forced by making car ownership more and more restrictive.

CONCLUSION

Content

This thesis aimed to understand how can carsharing become a driver for consumer adoption of the functional economy in the mobility sector by the Brussels population. To do so, we started by researching the existing theory on this topic, in order to better understand the subject and to already have some clues about the results, after which we conducted 16 semi-directive interviews with consumers. We decided to base ourselves on profiles that would be as heterogeneous as possible, deciding to choose 4 categories being: the use of car-sharing (or not), the ownership of a personal car (or not), the professional status and the cohabitation status. We also decided to interview some people who have a company car to have an opinion on the issues involved. Of course, all the interviewees live in Brussels, and have a driving licence, in order to follow the theme of the thesis and to have more relevant answers concerning the car. The aim of our methodology was then to fill in all the characteristics of each category at least once.

These interviews allowed us, first of all, to draw up a usage pattern of transport means by consumers and to be able to list the motivations and barriers to the various modes of transport used by the inhabitants of Brussels, including the car-sharing which was the focus of the research. Then we have been able to analyse which role this car-sharing could play in the adoption of a more functional economy in mobility by the Brussels consumer. At the same time, we were able to take a closer look at the different barriers and motivations of car-sharing mentioned to relate them to the theory and to analyse them a little more to see what were the problems and the assets in terms of the adoption of this type of transport. Finally, we made recommendations on how to make car-sharing more attractive to the population, in order to make the transition to the functional economy even faster and more efficient.

What has been firstly concluded is that car-sharing can act as a driver for the adoption of the functional economy in mobility, by fostering the substitution of the private car. Indeed, the car is still perceived as essential by the population for certain journeys. Car-sharing makes it possible to oppose the logic of limit use, by providing solutions appropriate to exceptional cases and thus allowing consumers to choose the mobility that corresponds to the majority of their travel. The number of vehicles owned by households and the size of vehicles could therefore be reduced. Another important point is that compared to the personal car, car-sharing pushes towards a reduction in car use. The pay-per use and the fact that access to the car is

made more complicated makes the user think before choosing the car and pushes him towards other solutions, including functional solutions. Car-sharing favors the transition to residual car use. Finally, car-sharing must be part of a complete ecosystem. To progress towards functional mobility, the ecosystem must be composed of as many modes of transport as the needs felt by consumers.

However, car-sharing remains a huge challenge for adoption, being still underused by the inhabitants of Brussels. This leads to the second conclusion, that there are many barriers to the adoption of car-sharing, both practical and psychological, and that the vast majority of these are often linked in one way or another to ownership. Whether from a practical point of view, with availability, proximity, comfort and all the rest, or from a psychological point of view, whether it is trust in others or the need for a certain individualism and status. Everything suggests that ownerless consumption remains a barrier for consumers in Brussels. These barriers can of course vary according to the profiles. For example, the barriers are not identical and do not have the same weight when it comes to those who do not have a car and those who do. Most car owners do not seem to be ready to part with their own car yet. It is still too much perceived as a sacrifice. At the same time car-sharing is usually considered as quite attractive by people not having private cars. Therefore, to substitute the private car-based model by a functional mobility model, the perception of other means of mobility, including car-sharing, needs to be changed to make them more attractive than the car. Otherwise, except if forced, no consumer will decide to change its behavior. Another obstacle to car-sharing to highlight in this conclusion is the role that the company car plays for the Brussels population, being an extremely advantageous mode of transport in all aspects for the user, except for the ecology. Finally, the lack of diffusion of car-sharing is also a real problem, as this type of transport is still poorly known by the majority of the public, which does not allow a rapid and effective adoption.

In terms of motivations, the price was often cited as important in the decision-making process, and as a mean that was cheaper than the private car if it was not used much. However, car owners expressed that price had less weight than their comfort of life, highlighting again the barriers mentioned above. Secondly, it was clear from all the interviews that ecology has a role in motivating car-sharing, being a primary motivation for some, and a secondary one for others, but that in both cases it was not the only factor to be taken into account and that all the other factors were also important. Ecology alone does not motivate change in the eyes of consumers.

The finale conclusion is that the car-sharing can become a driver for consumer adoption of the functional economy in the mobility sector by the Brussels population. Car-sharing would therefore fit into an ecosystem of different mobility solutions, into a more functional mobility, with varied offers for all needs and a centralised pricing system, more integration and more partnerships between the different parties. The users of this ecosystem would then have several means of travel available, at any time, and could choose the means that best meets their needs, while no longer owning a car. However, consumers' needs must be met just as efficiently as with the private car, by allowing them to move easily with these other means of transport.

Recommendations

This shows how important the car is in the minds of consumers, which makes car-sharing even more essential for the functional economy in the mobility sector to work. The challenge of adopting the functional economy in mobility is to adopt car-sharing as a first step, without which the population will never take the step of getting rid of their personal car. To achieve this, various solutions can be put in place:

- The need to change people's perception of ownership, and to show the various disadvantages that are not always perceived by consumers.
- Continue to offer competitive advantages to car-sharing in order to try to reach a level of comfort closer and closer to that of the private car, such as by continuing to create car-sharing car parks for example.
- To further improve all structures related to the functionality economy in mobility, in order to make the ecosystem of this mobility fully efficient.
- Offer no-committal test sessions to motivate consumers to try and potentially join the system more easily.
- Make even more use of platforms to facilitate and improve the links, the different procedures, and the trust, but also by enabling carpooling systems to be set up as part of the mobility ecosystem.
- Improving the awareness of non-users, be it via the different institutions or even users via sponsorships that would have the role of motivating dissemination on their part.
- Relying on political support to make the personal car less and less advantageous while making the functional economy more and more advantageous. In addition to this, we should also tackle the problem of company cars, which are still far too advantageous in the Belgian landscape.

Limitations

However, it is important to remain critical of this thesis and to point out some of the limitations that have been noted while writing it.

First of all, we are aware that 16 interviews are far from being a representative sample of the Brussels population as there are numerous different profiles. For example, amongst our interviewees, all of them were relatively wealthy. Interviewing disadvantaged consumers, for example, would undoubtedly bring a completely different dimension to the cost factor. Moreover, most interviewees come from the southern part of Brussels. It should therefore be taken into account that the reality of the facts expressed in this report may not be attributable to the north of Brussels and that it would be quite possible to continue this study with the northern part of Brussels, in order to see what might be different.

Secondly, it is important to remember that the problem of the company car has only been tackled on the surface and that the details of its benefits, such as tax benefits, deserve further investigation. Similarly, our recommendation to tackle the company car is therefore not fully exhaustive, failing to express how this should be done and what the potentially harmful consequences would be.

Thirdly, not all the categories that were chosen as a basis seem to be the most important in the attempt to profile consumers. Indeed, although we managed to get information about the importance of a car for a family with children or for freelancers or managers who travel all over Belgium, sometimes with security needs, it seems that these 2 categories had less impact on the results than being a car owner or a car-sharing user. It would therefore be interesting to dig a little deeper into these two categories in order to have more information.

Future research

This thesis can also be complemented by future research, to fill in some of the gaps and answer some of the questions that have not been addressed in this work. These future researches could therefore be linked to some of the recommendations or some of the limitations expressed above.

Therefore, future studies could then be developed on the improvements that could be made to car-sharing offers but also to other means of transport linked to the functional economy to respond as much as possible to all consumer's needs and foster adoption. At the same time,

studies should be done concerning the means of reducing the need for ownership which is still very present in our society.

To fill in the gaps of this thesis, future research could be done for the non-urban environment, following this methodology to make some comparisons and understand what the challenges encountered in this part of Brussels are. While following the methodology, more importance could be made on the professional status and the cohabitation status to see if some other aspects appear. Finally, research could also be written on the company car more in-depth to understand all the ins and outs of it and to see what the best solution would be to remove this advantage as soon as possible.

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